APPLIED KINESIOLOGY

VOLUME I

Basic Procedures and Muscle Testing

DAVID S. WALTHER

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Introduction

George J. Goodheart, Jr., D.C.

The opportunity to write a second preface to this series of carefully documented and edited books is again interesting, since time has continued to allow further development in applied kinesiology. The organizational genius of Dr. David Walther has produced a growing flood of physicians of all disciplines well-trained in applied kinesiological principles.

Applied kinesiology had a simple beginning in 1964, based on the concept that muscle weakness is involved in most muscle spasms and, indeed, is primary. The three-sided triangularity of man with the five-factor IVF circle superimposed has now been established as a means of understanding the problem of both biped man and the quadruped field of veterinary science. Lectures at leading dental schools and multi-disciplinary symposia have exposed many dedicated health professionals to a holistic concept which unifies rather than divides the healing arts. Lectures and demonstrations have been organized by interested members of all disciplines in many countries of the world; Norway, England, France, Australia, and Japan have ongoing teaching activity by many traveling diplomates of AK.

Scientific documentation in all the healing arts is accumulating in both the private professional sector and in established colleges and universities. Applied kinesiology, although multi-disciplinary in scope, was and is chiropractic in origin and function and has thus contributed to inter- and intra-professional dialogue, to the benefit of the patient and the doctor alike.

Applied kinesiology is based on the fact that body language never lies. The opportunity of understanding body language is enhanced by the ability to use muscles as indicators for body language. The original method of testing muscles and determining their function, first brought to my attention by Kendall, Kendall, and Wadsworth, remains the prime diagnostic device.

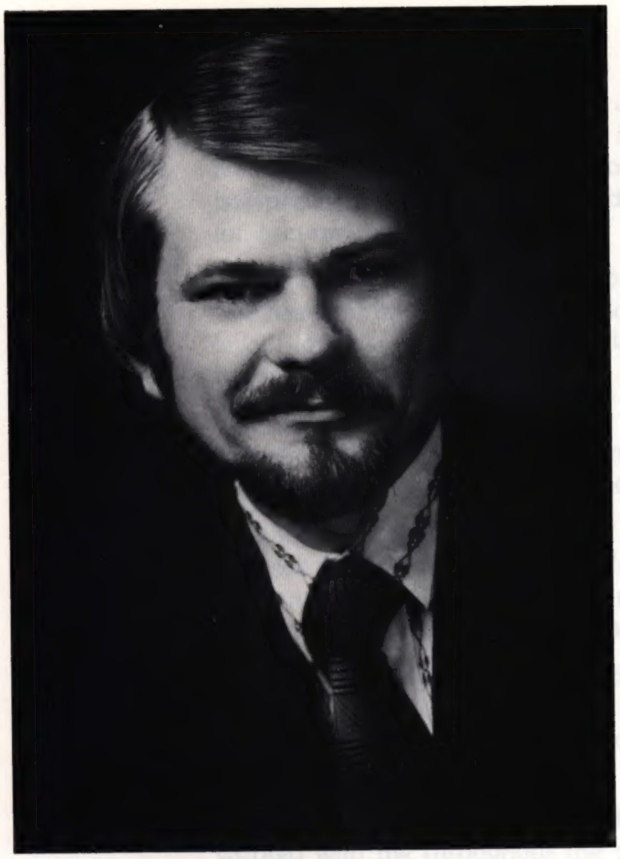
Once muscle weakness has been ascertained, a variety of therapeutic options is available, too numerous to enumerate here. The opportunity to use the body as an instrument of laboratory analysis is unparalleled in modern therapeutics because the response of the body is unerring; if one approaches the problem correctly, making the proper and adequate diagnosis and treatment, the response is adequate and satisfactory both to the doctor and to the patient.

The name of the game, to quote a phrase, is to get people better. The body heals itself in a sure, sensible, practical, reasonable, and observable manner. "The healer within" can be approached from without. Man possesses a potential for recovery through the innate intelligence or the physiological homeostasis of the human structure. This recovery potential with which he is endowed merely waits for the hand and the heart and the mind of a trained individual to bring it into manifestation, allowing health to come forth; this is man's natural heritage.

This benefits mankind individually and collectively. It benefits the doctor who has rendered the service, and it allows the force which created the structure to operate unimpeded. This benefit can be performed with knowledge, with physiological facts, with predictable certainty. It should be done, it can be done, and this book offers a means and a measure of how it can be done. My appreciation to Dr. Walther and his staff for the excellent job he has performed in advancing these principles, and my best wishes are extended to all who read this manual.

George J. Goodheart, Jr., D.C., FICC
Diplomate, ICAK

Preface



David S. Walther, D.C.

Applied kinesiology, a system which evaluates body function, has become a dynamic movement in health care in its relatively short existence. This text is the first in a series of five volumes on the subject.

Initial observations in applied kinesiology were introduced by George J. Goodheart, Jr., D.C., Detroit, Michigan, in 1964. Dr. Goodheart has been the leader in making new observations in the use of manual muscle testing for evaluating functional patterns of the body.

Hans Selye, in his book *Hans Selye: The Stress of My Life*, discusses the difference between true discovery and the development of an idea. He tells the story of how Alexander Fleming, observing the mold which infiltrated his bacterial culture and killed the bacteria, concluded that the mold was — in reality — a tool which could possibly be used to fight bacterial infection; thus the discovery of penicillin. Many before Fleming had observed this mold which spoiled cultures, but none had the foresight resulting from a creative, original mind to see the possible benefits this might have. Development, on the other hand, is applying scientific methods — such as double-blind studies and statistical evaluation — and obtaining a by-product value from the original study. Selye states "... it is characteristic of great basic discoveries that they possess, to a high degree and simultaneously, three qualities: they are true, not merely as facts, but also in the way they are interpreted, they are generalizable, and they are surprising in the light of what was known at the time of the discovery." These three criteria apply to many of Goodheart's observations, placing them in the realm of true basic discovery.

Applied kinesiology is a relatively young movement still in the developmental stage. The International College of Applied Kinesiology, organized in 1975, has as two of its major purposes basic research and the dissemination of education on applied kinesiology. Effort is being extended to help fund research projects in the colleges to better understand some of the phenomena observed on a clinical basis in applied kinesiology. Some members of the organization are developing research projects for the same purpose; other members report on clinical observations for others to study further.

This series of texts on applied kinesiology is a sequel to the author's first text, *Applied Kinesiology — The Advanced Approach in Chiropractic* (1976). The number of original volumes purchased exceeded all expectations. At the time of this text's release, the first text was continuing to sell at approximately the same rate as when it was originally released. The number of doctors using the procedure has continued to grow at a constant rate.

The author observed that many doctors who started to learn applied kinesiology quit; they felt it was too detailed, involved, and complicated. It isn't. There was simply very little reference material written in a single volume which tied the subject together for easy study. The desire for more doctors to learn applied kinesiology in an organized, systematic fashion was the stimulus to write the book, primarily for chiropractors already interested in natural health. Surprisingly, a large number of dentists, optometrists, podiatrists, Ph.D.'s in physiology and psychology, osteopaths, and medical doctors purchased the volume. Some, unfortunately, were confused by the lack of description and/or introduction to some of the philosophies presented.

This series goes into much more depth in applied kinesiology, covering many new concepts developed in the past five years. The volumes are organized so that specialty subjects can be studied individually;

however, all specialty subjects require this first volume as background since it covers applied kinesiology procedures and the use of manual muscle testing. The other volumes are as follows: *Volume II — Stomatognathic System* (including cranial-sacral primary respiratory mechanism, temporomandibular joint function, hyoid activity, and other associated subjects); *Volume III — Meridian System* (including unique applied kinesiology methods of evaluation); *Volume IV — Orthopedic Conditions;* and *Volume V — Systemic Conditions* (covering metabolic involvements, the endocrine system, digestive function, etc.). The volumes will be released sequentially as they are completed.

Few of the ideas and procedures in these volumes are the original work of the author, but he has successfully used them in a large clinical practice. A "thank you" goes to George Goodheart for his many original concepts and continued efforts in teaching others. When chiropractors over the years have expressed a desire for Dr. Goodheart to keep this knowledge within the chiropractic profession, he has repeatedly said, "You can only keep what you give away." This is so true!

David S. Walther, D.C.
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Acknowledgements

My appreciation goes to George J. Goodheart, Jr., D.C., for his discovery and continued sharing of observations in applied kinesiology. His contributions require an individual unique in the ability to observe what others overlook. My appreciation is especially extended to Dr. Goodheart for his review of the material in this book for accuracy and completeness.

My continuing love and appreciation go to my friend, companion, and wife, Jeanne. She has contributed many weekend and evening hours in doing the typesetting and layout for this book. Without her talents and tolerance of me, this work would not have been possible.

My associates in lecturing and practice, Benjamin C. Markham, D.C., and Robert M. Blaich, D.C., have contributed by reviewing the material and making suggestions, as well as being constantly available for the discussion of ideas.

The artistic renditions in this text are primarily the work of David M. Gavin. My appreciation is extended to him for his efforts and quality of workmanship. It is pleasant to be associated with an individual who continues to good-naturedly work to obtain the optimum illustration of our ability.

The reader, along with me, should have significant appreciation for my secretary, Carol Ann Hupp, who has typed the manuscript for this text many times. The reader should have this appreciation because she re-works the material to a more proper structure.

Daniel R. Maxson, manager of Walther Applied Kinesiology Seminars, has tirelessly worked with me throughout the production of this textbook. The photography, including darkroom production, has benefitted by his hand. His extra effort above and beyond the call is greatly appreciated.

The majority of material in this text is a compilation of the work of others. My appreciation — as should that of all others in the healing arts — goes to the creative thinkers, research scientists and authors who have presented material before. We have all called on their work, and sometimes fail to remember that what can be accomplished today is directly related to their efforts in sharing. As knowledge grows, the vast amount of background information comes better into perspective.

Along with the standard anatomy, physiology, and chiropractic body of knowledge, I have throughout this text called on information from the Collected Papers of the Members of the International College of Applied Kinesiology. Because of the members' efforts to share with their fellow physicians, we all benefit.

Finally, this material is dedicated to you, the practicing physician, with the sincere hope that it will aid many thousands of individuals in obtaining health through natural methods.

Table of Contents

Section I

Section II

Section I

Applied Kinesiology Procedures

Chapter 1

Introduction to Applied Kinesiology

Applied kinesiology is a system of evaluating body function that is unique in the healing arts. It has grown rapidly, both in the number of physicians using it and in its concepts and scope. The procedures, which were developed in the chiropractic profession, appear to be such that they can be used by all branches of the healing arts.

The combined terms "applied" and "kinesiology" describe the basis of this system, which is the use of manual muscle testing to evaluate body function through the dynamics of the musculoskeletal system. "Kinesiology" comes from the Greek word "kinesis," meaning motion, and "ology," meaning the study of a science or branch of learning. Kinesiology, then, means the study of the principles of mechanics in anatomy in relation to human movement. The term "applied" puts into perspective this utilization of kinesiology. According to Webster,[17] the first definition of "applied" is: "Put to practical use: engaged in for utilitarian or contributory purpose: concerned with concrete problems or data rather than with functional principles." This certainly describes the use of kinesiology in the practical application known as applied kinesiology.

Some who use applied kinesiology in their practices have begun to refer to the procedures used as simply "kinesiology." This should be avoided because the term "kinesiology," when used alone, refers to the study of motion, a discipline in itself. The use of the term "kinesiology" when referring to applied kinesiology creates confusion for those who are familiar with the former term but not the latter.

More and more investigators of human physiology are emphasizing that the body works as an organized whole, stating that the whole is greater than the sum of its parts. This undeniable fact has unfortunately been overlooked in many investigations designed to find the cause of health problems. As a result of limited investigation, the cause of specific health problems has sometimes been attributed to an obvious factor in the condition; however, it is not the sole underlying cause because the investigation has been limited to a specific system, organ, or structure.

With the great amount of knowledge in biophysiology, it is only reasonable that specialties in the health care field have developed. Unfortunately this has led to investigation on a clinical basis and research into "parts" of the body. Clinicians in various specialties may see the same clinical entity that the patient presents, but they react to it as if it were a peculiarity to the condition being investigated in their specialty. Selye[15] recognized the syndrome of "just being sick," which led to his development of the "general adaptation syndrome" or "stress syndrome." Without his observation of the total person, these far-reaching findings would not have been discovered at that time.

The research of parts reminds one of the story of the three blind men who went to the circus for the first time. The first felt the elephant's trunk and described the animal as being like a snake; the next, touching a leg, described a cylindrical animal which must resemble a tree; and the third, feeling the body, described a large, mass-like animal.

Applied kinesiology deals largely with functional health disturbances, as opposed to pathology. Although a chronic functional disturbance may ultimately lead to pathology, there is a major difference in the diagnosis of the two. Pathology is a state of tissue alteration which can be evaluated in a cadaver, dissected, and histologically studied down to the microscopic parts. Functional disturbances cannot be studied that way; in fact, some of the procedures used for evaluation may change the functional nature of the condition. It is well established that dry needling will clinically remove trigger points.[16] Is it possible that in some instances needle or fine-wire electrode insertion for electrophysiologic study may change function? Northrup[10] (a participant in the workshop on Neurobiologic Mechanisms in Manipulative Therapy), when referring to the musculoskeletal lesion, stated, "It's not a **thing**; it's a complex process, a lesion of **motion**, not something you can section or biopsy or see on the autopsy table. It's a functional disorder; it is a dysfunction."

Genetic factors and developmental differences between individuals make each one unique. This has been recognized as biochemical individuality by Williams.[18] Individuality must be taken into consideration regarding all aspects of health. Cole[3] referred to Bauer, who summarized individuality by indicating that ". . . pathogenesis of disease caused by the same intrinsic etiologic factors in different persons varies according to the differences in individuals;

there are many factors within each individual that influence the clinical course of disease." Individuality is apparent, particularly in the nervous system. Many reflexes are mediated by supraspinal centers, which can add an emotional component to the reflex. The nervous system develops in various ways, depending on an individual's mental and physical activity. It is probable that the nervous system also adapts to nutritional and other chemical influences throughout its period of development and function throughout life.

It seems safe to state that each individual may react differently to various stimuli if the total organism is taken into consideration; thus it becomes necessary to have some method of diagnosis that takes these variables into consideration. This ability would give individual consideration to various conditions, rather than just making comparisons with standards considered "normal" in laboratory diagnosis, neurologic reflexes, and standard physical diagnosis.

Applied kinesiology is a system which uses the patient's body as a laboratory of investigation, taking into consideration a wide range of potential functional disturbances. The comprehensive evaluation this system encompasses places it in step with the recent trend in health care. This approach has been termed "holistic," referring to the need for evaluating structures, chemical influences (including nutrition), and the individual's psyche.

Applied kinesiology originally dealt only with muscular imbalance in the body, as observed by manual muscle testing. Its comprehensive approach to evaluating factors which influence the total body came about as a necessity for balancing muscle function. It was clinically found that many factors could be detrimental to muscle function. These have been categorized into the "triad of health," which encompasses structural, chemical, and mental factors. It has become a system which appears to evaluate neurologic reflexes within the soma, somatovisceral, viscerosomatic, and viscerovisceral.

Many feel that any comprehensive system would be extremely difficult to master; the opposite is true. When more controlling mechanisms and energy patterns are considered, the examination leads to the basic underlying cause of a health problem, giving a solid foundation from which to work.

Applied kinesiology relates to most therapeutic approaches. Chiropractic's vertebral subluxation, the meridian system (acupuncture), cranial-sacral primary respiratory system, nutrition, medications, and the nervous system in general can all be evaluated to some degree with applied kinesiology methods. It appears from applied kinesiology investigation that when a physician is confused by a pattern shown by a patient, there is often a causative factor in some system of which he is unaware. This frequently occurs when the meridian system, cranial-sacral primary respiratory system, nutrition, etc., are involved. Recognition and understanding of these additional factors may present the foundation for correcting a condition. Considering the significance of interrelationships of the different systems, organs, and glands of the body, it is easy to see how the cause of a health problem is often remote from the symptomatic picture about which a patient complains. Applied kinesiology seems to allow us to use the integration of body function to an advantage, rather than the disadvantage it usually is in diagnosis.

The need for a diagnostic tool in functional health problems has been long-standing. It is interesting to note that when there is no one superior system, many are developed. Observe the innumerable methods which have been developed to evaluate spinal subluxations. Goldstein[6] recognized this in his "Introduction, Summary and Analysis of the NINDS Workshop on the Research Status of Spinal Manipulative Therapy." He discusses palpation and x-ray as methods of examination. Other than clinical experience, there was not yet evidence of reliable interexaminer palpatory findings. When x-ray was discussed, there was controversy among those in favor and those against. He went on to summarize diagnosis by stating that ". . . other objective diagnostic modalities were also presented, but stimulated minimal discussion; included were thermography, electromyography, spinogram, and techniques for evaluating posture."

Applied kinesiology can be the diagnostic tool to evaluate functional disturbances. A study was performed by Scopp[14] to determine the accuracy of manual muscle testing between examiners. The muscle tests were performed objectively with a Jaymar hand dynamometer. Ten subjects were tested by six trained examiners. The data was analyzed by Pearson product-moment correlation [4, 1, 8] and showed .91 between examiners, suggesting that muscle testing is reliable on an interexaminer basis. In evaluating nutrition recommended for specific muscular weaknesses, Scopp either gave the nutrient recommended in applied kinesiology or a placebo. He found a statistically significant ($P<.05$) increase in muscle strength in the nutrient group over the placebo group. There was a small non-significant pre-post decrease in muscle strength in the placebo group. Further study was done for cerebral allergy testing compared to Philpott[12] type fast with progressive re-introduction of foods. There was a .81 correlation between foods identified as provocative by the two methods. (Allergy is discussed in Volume V.)

In applied kinesiology, there is an association between specific muscle weakness and possible organ involvement (Chapter 2). Carpenter et al.[2] objectively evaluated the muscle-organ association by using a spring-loaded dynamometer. They found a correlation between the muscle-organ association described in applied kinesiology. Although these and other studies have been done to objectively evaluate applied kinesiology's position, additional laboratory studies are needed to put into perspective the clinical observations which have been made.

In the process of teaching applied kinesiology, I find — on an informal basis — a high degree of reproducibility among skilled operators. It must be recognized that manual muscle testing consists of an infinite amount of change between a "strong" muscle and a "weak" muscle. When the muscle strength appears to be in the middle ranges, it becomes a judgement call of the clinician. This is not a great problem because most indications for treatment are in the area of significant change of muscle strength as observed by manual muscle testing.

Although applied kinesiology appears to be a significant

asset in the evaluation and diagnosis of body function, it is not a panacea for these purposes. It augments the standard diagnostic approaches used in all aspects of health care, but it is **not** necessarily a treatment system. Most of the treatments used by applied kinesiologists are the same procedures found in all branches of the healing arts. Certainly there have been many therapeutic approaches developed within the framework of applied kinesiology, because new functional problems have been discovered with its use. Necessity being the mother of invention, therapeutic approaches had to be developed for the problems found, in addition to applying known methods.

In addition to the need for additional diagnostic tools for functional health problems, there has been a need to determine if corrections are obtained by therapeutic efforts. The use of manual muscle testing as an evaluation tool is applicable immediately after a corrective attempt has been made. In fact, it can be extended to evaluate the effect of various types of stress on body function to determine if some factor in the patient's life style, habit pattern, etc., is re-creating the functional problem. An example is locating a subluxation, attempting correction, re-examining to determine if correction was obtained, and if so, having the patient walk, lift, bend, etc., to determine if the subluxation recurs. If the functional problem does recur from some form of stress, the physician is guided to further examination procedures which will usually find the basic underlying cause of the recurrent problem.

Many of the treatment procedures used to eliminate indications of functional problems in applied kinesiology are reversible. For example, a dysfunction of the cranial-sacral primary respiratory system may be observed by manual muscle testing and correction applied, eliminating indication of the involvement. The physician can then reverse the correction, returning the indications of involvement as observed by the muscle test. Although this reversal of correction, returning the condition, is not generally applied or recommended, it is present with many of the approaches used in applied kinesiology, such as manipulation, nutrition, reflexes, acupuncture, etc. This seems to fulfill one of the criteria for scientific investigation; more important, it gives a better opportunity to study certain types of conditions.

The evaluation methods of applied kinesiology have been adopted by some doctors in all phases of the healing arts. Each finds his own specialized use for the methods described. It is necessary that all branches understand and use this system, because there is no specialty which can correct all the health problems evaluated. Applied kinesiology provides a method of evaluation which can help develop interaction among the professions dealing with the world's health problems. To my knowledge, there has never been anything in the healing arts as capable of developing this communication as is applied kinesiology.

The original principles of applied kinesiology were developed by George J. Goodheart, Jr., D.C.[7] I first became acquainted with Dr. Goodheart through a desire for additional information on an article he had written in *The Digest of Chiropractic Economics* on "Urinary Laboratory Testing Procedures." Upon telephoning him, I found him to be more knowledgeable about all aspects of chiropractic than anyone I had previously known in the profession. This phone call was the first of a series, some lasting an hour or more. Dr. Goodheart continued to amaze me with his overall knowledge and recall.

I began using applied kinesiology after Dr. Goodheart presented his original origin/insertion technique at the American Chiropractic Association's 1965 annual meeting in Denver. Since that time, applied kinesiology has developed from a simple technique to a wide-ranging, comprehensive system, reaching out to new frontiers. During this 16 years of using applied kinesiology, all has not been rosy. There have been many times when I could not accept new material, simply because it did not fit with knowledge learned earlier. Over the years there have been two basic thoughts which have helped my growth, and which I hope will be considered as others study applied kinesiology.

First, **"You cannot recognize what you do not know."** This is so applicable to our examination of a patient! It is frequently why the cause of the patient's health problem is missed. Second, **"You don't know what you don't know until you know what you didn't know."** We must feel very sorry for the pompous physician who thinks he knows everything as he sits in his ivory tower. Physicians must be constant students until everyone is well.

Within this text there are descriptions of procedures which may be difficult for some physicians to accept and put into their framework of knowledge. Some who have reviewed this material before publication have suggested that particular subjects be left out to avoid alienating individuals who are considering applied kinesiology for the first time. Editing this material in this manner was considered; the decision was made not to leave out the potentially controversial material. Everything included here appears to work on a clinical basis for a large number of physicians. Not to publish it retards growth; only by making the procedures more widely known can further evaluation and research studies be developed.

It seems to this author that there is sometimes an unfortunate relationship between many clinicians and the scientific community, especially where chiropractic is involved. The clinician who has developed a technique and is teaching it to the profession refers to the college person as having never developed any original research. Continuing, he infers that almost everything new in chiropractic has come out of the "field." On the other hand, college people refer to the clinician as an "itinerant technique peddler" or an "entrepreneur," usually with distaste and disgust. The scientific community frequently refers to the entrepreneur as one interested only in the money he can get out of the profession by teaching his "courses," not realizing that in many cases the clinician could derive greater monetary dividends by concentrating directly on a personal practice. They also fail to recognize the amount of money many clinicians have spent in developing their ideas. On the other hand, the clinician is bitter because his ideas have not been accepted in colleges, because there have been no double-blind studies or other types of data developed.

It is time that a unifying effort be developed on a mass scale by all individuals concerned. In many cases, the clinician's mind does not think in double-blind studies or in

electrophysiology. He deals with the day-to-day, gut-level problems of getting sick people well. The scientist has an organized, methodical mind which lends itself well to double-blind tests and the rigidity of scientific investigation. His abilities are valuable in determining the mechanisms of various phenomena, giving statistical analysis to determine the probability of an apparent process being real or coincidental. On the other hand, the scientist's mind may not have the creativity necessary for the development of original, fresh approaches to the problems facing mankind. Ornstein,[11] discussing W. I. B. Beveridge's book, *The Art of Scientific Investigation,* presents some interesting thoughts. Beveridge stressed the need for scientists to develop their intuitive side. He defines intuition in science as ". . . a clarifying idea which suddenly comes to mind." This seems to fit the need to solve gut-level problems faced by the clinician.

Unfortunately the chasm is still too wide, although it has decreased in recent years. The problem probably developed as a result of the clinician's lack of training in scientific discipline. In more recent years, students in nearly all of the colleges receive training which is bringing together the disciplines of the clinician and the scientist. It is my desire that this series of texts will help bridge this gap. The clinician and the scientist function best when they work together. Each has his area of expertise, and rarely is there an individual who is highly proficient in both disciplines.

While on this subject, I might as well voice another concern. In the past there have been efforts to promote one treatment technique over another, with an attitude of superiority. **There is no superior technique.** Each approach has its advantages and its disadvantages. Some techniques are advantageous for a patient's specific problem because of the patient's characteristics, while another technique may be advantageous for the same condition in another patient. The most advantageous technique will vary according to the clinician's skill in manipulation, physical size, and available equipment. It is necessary to encourage a working relationship among the clinicians who have developed various techniques. This is just as important as the scientists and clinicians working together. There has been an improvement in the exchange of ideas in recent years, but a total round-robin of interrelationships is needed.

The material in these texts has been developed from the clinical aspect of health care. I take the liberty of quoting some of Goldstein's[5] remarks as he chaired the opening session of the research workshop on Neurobiologic Mechanisms in Manipulative Therapy at Michigan State University in 1977. "We begin the workshop at the proper end of the scientific spectrum, namely the experiments which nature has provided us. As skilled observers, we have the opportunity to watch these natural experiments that usually occur in our patients and in the population as a whole, giving us insight and leads to biological phenomenon for the study of which we can retreat to our laboratories, where we try to control all variables but one and to come out with meaningful data. Hence we start with clinical observations and emerging questions . . ." His thoughts seem to put the necessity for all groups and individuals to work together into perspective.

How did this thing called applied kinesiology come about? What is its current status, and where do we go from here? Nearly everyone involved with applied kinesiology has thoughts regarding these questions. More important, a person being introduced to applied kinesiology deserves an attempted answer to these questions as part of the introduction to the subject.

When examining a patient and discovering an unusual pattern, Goodheart constantly asks the question, "Why is that?" In a busy clinical practice, it is easier and more productive to overlook the somewhat unusual and sporadic findings seen in various patients. To "look with eyes that see, feel with fingers that feel, and hear with ears that hear," and to think through each unusual situation, is both an advantage and a disadvantage in a clinical practice. The average busy practitioner tends to overlook little individual subtleties because it is expedient and "the reception room is full." Goodheart is a clinician who has an inquisitive mind and the knowledge of diverse therapeutic approaches. His primary effort is that of "an ongoing therapeutic approach." His effort is geared to finding an approach that will make the patient at hand function correctly.

The driving question, "Why?" has led him to investigate new theories and hypotheses about the way the body is integrated. Advances are not made until someone constructs a conceptual framework. Because he has instilled in his students the question "Why is that?" others in the International College of Applied Kinesiology are contributing new ideas, rehashing the old, testing hypotheses, and packing down the information into a practical, workable clinical system which appears to be significantly helping improve the health of mankind — the ultimate goal of the healing arts.

Hypotheses and theories presented in applied kinesiology regarding why different factors work may need revision as more knowledge is obtained. Again, advances are not made until someone produces a conceptual framework. In this text and in applied kinesiology, there has been an attempt to develop a hypothesis for the use of a procedure, rather than just saying, "It gets results." It is recognized that some of the hypotheses may be wrong and others only partially correct. An hypothesis is developed to state a concept; from there it can be taken to the laboratory, and an effort can be made to control all variables except that being considered. Hopefully this will result in meaningful data as to the exact mechanism involved, as Goldstein commented. The hypothesis may need to be changed or modified to fit the developing knowledge.

In an effort to quantify muscle testing to investigate some of applied kinesiology's hypotheses on an objective basis, I have installed laboratory equipment. Upon becoming aware of this effort, many doctors enthusiastic about applied kinesiology have approached me with the comment, "I'm glad you are going to prove applied kinesiology is right." This is not what research is about at all. **Never** should a researcher set out to prove something is right. The process is to ask a question, then develop and analyze data to determine what process is taking place. If it confirms a hypothesis, well and good; if it does not,

determine what mechanisms are taking place and develop a new hypothesis for further testing.

There are references throughout these texts which have one or more of three basic purposes: (1) to credit the individual who had the original idea or did research on the subject, (2) to give a source for further information on the subject being discussed, and (3) to correlate the subject with some of the research which has already been done. Haldeman[9] warns about using bits and pieces of research here and there to support an idea. This has been referred to as "library research," where pieces of information seem to support an idea; it becomes an end rather than a beginning. Working hypotheses are important and necessary tools in research. An hypothesis can be repeated so often that it becomes accepted as truth and then hampers instead of promotes progress. The ideas and procedures presented in this text should not be considered as end products but, as labeled, hypotheses. Continued investigation should either solidify them into theory, or change the hypothesis to fit the increased knowledge.

The procedures discussed here should also be viewed according to the sophistication of the evaluation methods. A clinical evaluation means that the information is from the expertise of the individuals doing the repeated observation and evaluation. It has not been subjected to statistical analysis, double-blind tests, and laboratory procedures. Manual muscle testing means that the quantification has been in the examiner's experience and not developed by objective machine testing (see the section on "Science and Art of Manual Muscle Testing, Chapter 15, for further information).

The absence of a wide spectrum of scientific laboratory data should not be a deterent to the use of applied kinesiology. Many procedures in the healing arts which are used and generally accepted have developed in the same manner. Applied kinesiology is relatively young. In its short existence, it has had its share of studies to quantify change in function from treatment and evaluation on an objective basis. Many of these studies are cited in this text and others of this series. At this time, the strongest support is reflected by its successful use by a large body of clinicians. An effort made in this text is to report the procedures as they appear to be accepted by a general concensus of those using the discipline.

A criterion is necessary to determine what material is to be taught in applied kinesiology. The principle under which Goodheart and the International College of Applied Kinesiology function is that a procedure must be reproducible by any individual who has been trained and has developed expertise in the procedure. It appears that applied kinesiology sometimes deals with very subtle "energy patterns" of body function. It seems that some individuals can apply apparent therapeutic approaches and obtain results which cannot be accomplished by others. Although these procedures may be valuable to that individual, they cannot be taught to others who may not have the same capabilities and mental matrices. This has recently been pointed out by Schwartz,[13] where he classifies various techniques as (1) those which work for any individual trained in the activity, and (2) those which operate on the principle of mental matrices. The second category comes into the realm of parapsychological approaches which depend on powerful mental images. He goes on to discuss different techniques which operate on this basis, warning of their inclusion in applied kinesiology.

In this text, an effort has been made to include only those techniques which work for all who are trained in them. The ICAK officially takes a similar stand; however, there are individuals within the organization and in general applied kinesiology who have observed — and strongly believe in — techniques which appear to fall under Schwartz' second classification. Objective evaluation of various techniques and hypotheses in applied kinesiology should continue to separate approaches into the two categories.

All individuals who use muscle testing to evaluate various parameters cannot qualify as applied kinesiologists. Unfortunately, there are many who use muscle testing without adequate training or expertise in the discipline. They often use procedures which Goodheart and the International College of Applied Kinesiology have evaluated and rejected, due to a lack of clinical reproducibility among individuals trained in the procedure. These may include types of muscle testing, evaluation of nutrition and chemicals, and procedures of a parapsychological nature. Unfortunately, people who are not familiar with applied kinesiology often think they are evaluating AK when they observe this type of testing procedure, believing that it is the sum and substance of the system. These are some of the growing pains that a new discipline must endure, while those who are interested fervently work to teach what applied kinesiology really is.

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Chapter 2

Fundamental Procedures

Facilitation and Inhibition of Muscles

Shoulder Facilitation and Inhibition

The skeletal muscles constantly undergo facilitation and inhibition. The nervous system controls the strengthening and weakening of the muscles in an organized and pre-determined manner. Applied kinesiology evaluates the appropriateness of this facilitation and inhibition by manual muscle testing. An example of this neurologic activity is the change of activity in the shoulder flexors and extensors when tested as individual groups.

In a normally functioning individual, there should be close to equal resistance of the shoulder flexor and extensor groups when tested in a comparable manner. This can easily be demonstrated in a normally functioning subject. One should assume that the subject does not have any foot problems, spinal involvement, headaches, shoulder problems, etc. These areas of dysfunction are generally manifested by tension in the neck or spine, fatigue at the end of the day, leg aches, etc. Any or all of these disorders may alter the integrity of the mechanism being demonstrated. Remember when attempting this demonstration that many people do not qualify as functioning in a completely normal manner, even though they may manifest no symptoms.

2—1. Shoulder flexors being tested in normal, balanced position.

2—2. With leg opposite side being tested forward, shoulder extensors will test weak on a normal subject.

First, test the flexor and extensor groups of muscles in a balanced standing position. This procedure should be done with the examiner providing good stabilization of the shoulder girdle and the subject keeping his elbow in full extension. Both groups should test strong; if not, the subject is not a candidate for this demonstration. Next, have the subject simulate a walking position by stepping forward with the leg opposite the side being tested, slightly flexing the knee and putting the majority of his weight on that extremity. This will leave the leg on the side being tested with slight knee flexion and less weight on the extended toes. Test the extensor group of the shoulder; if the subject is functioning normally, the group will now not resist the testing pressure as compared to the first test. The flexor group will test very strong. This is normal neurophysiology of reciprocal innervation in action. In this phase of gait, the nerve endings (proprioceptors) in the foot, leg, pelvis and shoulder girdle are sending information into the neuronal pools of the brachial plexus, indicating that walking is taking place. During this phase, the arm which was tested would normally be swinging forward; consequently there is inhibition of the muscles that hold it in a backward position, and it swings forward in a pendular fashion.

To further demonstrate this turning on and off of the shoulder flexor and extensor groups, have the subject reverse the gait position, bringing the leg on the side of test forward in a weight-bearing position, with the opposite leg trailing and carrying very little weight. Remember, the knees, ankles, and toes should be bent into as near a normal walking position as possible to accurately stimulate the nerve endings, simulating walking. Now the extensor group of shoulder muscles will test very strong, and the flexor group will not resist the testing pressure in the normally functioning individual.

If the above demonstration does not work as described, then either the subject has dysfunction of some nature within the body, or the muscle testing is not being applied accurately. The dysfunction could be in the foot, other areas of the lower extremity, the spinal column, or the shoulder itself. For that matter, the dysfunction could be literally anywhere in the body. An examiner experienced in applied kinesiology techniques can easily find the reason for lack of normal facilitation and inhibition.

The demonstration can be taken a step further by creating the abnormal out of the normal subject. Again, with the subject in a normal stance, test the flexion and extension groups of the shoulder for normal strength. Also test the adductor and abductor shoulder groups. They should all be strong in the normal individual. For the experiment, the abnormal can usually be created by placing pencils under the first and fifth metatarsals, causing the metatarsal arch to drop, thus in effect creating a subluxation or subluxations in the metatarsals. While the subject is standing on the pencils, re-test the four groups of shoulder muscles. Some or all of the muscles will not be able to resist the testing pressure, which is evidence of confused nerve functions, described more thoroughly in the applied kinesiology discussion of foot physiology in Volume IV.

The shoulder demonstration is primarily that of the nervous system's facilitation and inhibition of muscle function. It can easily be recognized that if there is some dysfunction of the structure of the body, inappropriate facilitation and inhibition are taking place, coordinating body movements throughout the day. The example shows that dysfunction of the foot can be associated with shoulder problems. There are more than a dozen shoulder muscles having different functions in the range of shoulder motion. All of these muscles must function with the precision of a great symphony. One muscle receiving inappropriate stimulation from neurologic interactions as a result of dysfunction of the foot or some other source is equivalent to a rock beat coming from the percussion section of an orchestra during Beethoven's Fifth Symphony. The inappropriate function can cause muscular and joint strain. Constant joint strain may ultimately manifest itself as inflamed bursa and eventually calcific bursitis, especially if the subject's chemistry is such that calcium easily precipitates out of solution. Under these circumstances, resolution of the shoulder problem is dependent upon direct therapy to the shoulder and to the pedal imbalance.

Effects Throughout The Body

The ramifications of this type of dysfunction go much further than described. Obviously, the muscles of the shoulder are not the only ones influenced. The muscles of the spinal column and those supporting the skull may become greatly imbalanced, causing even more health problems throughout the body. Spinal dysfunction can develop, causing reflex and direct interference with normal nerve transmission from the spinal cord to the peripheral and autonomic nerve systems, which in turn do not control their target areas correctly. The consequent dysfunction can be in an organ, gland, or musculoskeletal stress.

Improper facilitation and inhibition of muscles during walking can affect another very important area, which can cause health problems throughout the body. Sutherland,[23] an osteopath, described minute motion at the sutures of the cranium. There is evidence that the integrated, rhythmic motion of the cranium is necessary for normal health. Carrying the previous illustration a step further, it can be seen that incorrectly timed facilitation and inhibition of muscles — such as the sternocleidomastoid, upper trapezius, and others — can distort the cranium in such a manner as to disturb the minute cranial movement which must be organized for normal function. Cranial dysfunction can result in aberrant function of the cranial nerves, accounting for many other disturbances of normal physiology.

So far this discussion has related to facilitation and inhibition of the muscles through the nervous system. With increased knowledge in applied kinesiology, many factors have been discovered which cause various skeletal muscles to be strong or weak. Possibly all of these are mediated by the nervous system; current knowledge in neurophysiology is not adequate to definitively make this observation. As we continue with the study of applied kinesiology through these texts, it will be seen that energy patterns — such as those of the meridian system of acupuncture, thought to be electromagnetic in nature — affect muscle strength. There is evidence that the meridian system intermediates with the nervous system.

Muscle Testing — A Precision Tool

Manual muscle testing will dramatically reveal both normal and abnormal physiologic activity. A great deal of new information has been learned about the body's function by evaluating how muscles react to physical, chemical, and mental stimuli. Treatment procedures which were at one time empiric have now gained stronger clinical support and are more thoroughly understood. In fact, some of these treatment procedures, found to be clinically effective by their practitioners, were considered illogical and unworkable by the scientific community. In some cases, it

is now easy to understand many different treatment modalities that at one time were considered cultish and unscientific. As we gain more knowledge about the function of the body, some of the explanations of the mechanisms involved with these therapeutic approaches need to be modified to correlate with current knowledge.

Manual muscle testing is an effective tool which provides its advocates with considerable insight into the amazing intricacies of the body and the holistic concept. As valuable as this tool is, however, its use has significant pitfalls which can cause the unwary and untrained to stumble.

Manual muscle testing is a discipline requiring a high degree of technical knowledge of anatomy and physiology. This book discusses the science and art of manual muscle testing, first in a general manner and then specifically for each muscle tested in applied kinesiology. Some muscles are very easy to test; others require numerous considerations regarding optimum isolation, stabilization, fixation, and vector of force.

In applied kinesiology, the results of manual muscle testing have been referred to as "strength" and "weakness" of the muscle. The term "weakness" infers that the muscle is incapable of producing power. Different forms of muscle strength testing indicate that this is true in some cases, but not in others. Manual muscle testing as used in applied kinesiology requires the contraction of the muscle being tested against the examiner's applied pressure. The examiner continues to apply pressure until the muscle being tested goes from an isometric to an eccentric contraction. An eccentric contraction is one where the muscle is producing force, but is lengthening since the opposing force is stronger than that being produced by the muscle. So, in effect, applied kinesiology manual muscle testing is done to determine the "locking" capability of a muscle against a testing pressure. When the muscle being tested has poor locking capability, the examiner perceives it to be weak; thus the terminology of weak muscle has been developed in applied kinesiology. Sometimes the muscle actually is weak; however, other testing methods reveal that the muscle often has the capability of generating normal strength. This can be observed when the examiner slowly builds up his testing pressure; this will frequently make the muscle appear to be much stronger than when the standard testing velocity is used.

Abnormal muscle function as observed by manual muscle testing in applied kinesiology probably has several physiologic mechanisms. There is evidence in both published and unpublished studies that there is a failure of the muscle to function in a normal timing sequence. (This will be discussed in appropriate sections throughout these volumes.) In some instances the muscle locks poorly against an opposing force, but can generate considerable strength when operating in an isotonic manner. In other instances, the muscle cannot resist repeated testing pressures, but it can function normally against a single test. The timing factor is also represented in some muscular dysfunction by inability to contract for a protracted period of time.

Throughout applied kinesiology's history, there have been numerous testing devices utilized in an attempt to quantify muscle strength. These devices have given additional information about the testing procedures, but continued evaluation is necessary.

The dynamometer used in orthopedics to evaluate gripping capability of the hand has been used, with the examiner interspersing the device between his testing hand and the patient's extremity. This is usually extremely cumbersome, and the metallic contact often causes pain to the patient. It has not been found very satisfactory as a testing device.

A simple device is to contain the bladder of a sphygmomanometer in a bag. The bladder is moderately inflated, but not enough to register pressure on the pneumatic gauge. The partially inflated bag is then held between the examiner's hand and the patient's tested extremity, similar to the hand dynamometer mentioned above. As the testing is accomplished, the millimeters of mercury pressure are observed by the examiner. This testing device requires very accurate positioning of the bladder, so that it is centered in the testing activity, for any reproducibility. It also is cumbersome and, because the measurement must be read during the testing activity, adds another problematic factor to the test.

Mechanical spring gauges and transducers have been attached to various forms of framework so that the testing device is held stationary, and the patient's extremity is attached to the measurement device. The patient pulls against the device to record the amount of power generated by the muscle. This method takes the operator out of the examination, thus reducing one variable. The factor of timing as discussed above is not taken into consideration by this testing method. The examiner must also watch very closely for change in patient position and consequent substitution of synergistic muscles for the prime mover being tested.

The Cybex II dynamometer by Lumex[6] has been used by several, including our laboratory, as a method of evaluating muscle activity with applied kinesiology techniques. The Cybex II evaluates muscle contraction as isometric or isokinetic. When the test is isokinetic, the dynamometer is capable of controlling the speed of muscle contraction from 0-300 degrees per second. Testing in this manner sometimes parallels the manual muscle testing of applied kinesiology. In other instances, the Cybex II fails to reveal the weakness that is exhibited on manual muscle testing; in fact, it will sometimes show the muscle to actually be producing greater power than the contralateral muscle which tests normal with manual muscle testing.

Blaich[3] compared manual muscle testing with that of the Cybex II in a study of sacral primary respiratory function. The dynamometer failed to reveal muscular weakness on 60% of the patients who exhibited weakness on manual muscle testing. The Cybex II did reveal return to normal strength after treatment, or a significant trend for the return, in 100% of the cases in which weakness was revealed.

There is significant evidence that the abnormally functioning muscle, as revealed by manual muscle testing in applied kinesiology, is not simply weak. The abnormal function appears to be related to neurologic recruitment problems affecting the muscle's ability to maintain contraction against resistance. Obviously, further studies are

needed, but the studies which have been done — both published and unpublished — seem to support this concept. The classification of "weak" and "strong" muscles should be questioned and possibly eliminated from applied kinesiology terminology as additional knowledge is gained about the exact mechanisms causing the muscle to be incapable of functioning normally during manual muscle testing, and sometimes against dynamometers such as the Cybex II.

Throughout these texts, the terms "muscle strength" and "muscle weakness" will be used periodically because of lack of better terminology. It should be understood that the terms refer to muscle activity from manual muscle testing unless otherwise described.

It is unfortunate that some untrained individuals have abused the principles of manual muscle testing and applied kinesiology. This abuse probably develops as a result of the dramatic change in muscle activity which is observed when correct procedures are used. A person lacking in knowledge, whether physician or layman, may unconsciously make things happen with exuberance by not performing manual muscle testing in an expert, objective manner.

An examiner who is experienced in manual muscle testing can easily make a subject's muscle appear weak or strong at his discretion by simply changing the parameters of the test very slightly. These changes may be a slight velocity or vector change, a slightly different leverage factor, failure to adequately stabilize, etc. In most cases, the subject or uninitiated observers will not be able to see the parameter change which made the muscle appear to change in strength. The uninitiated and inexperienced subconsciously or accidentally make these same parameter changes, causing both the examiner and the subject to be misled.

The experienced muscle tester who uses the science and art of muscle testing can easily spot inaccurate muscle testing because of change of parameters. A discussion of factors to observe when others are doing manual muscle testing is presented in this text under "The Science and Art of Manual Muscle Testing." It is important for those who use manual muscle testing, or for those who are subjected to the demonstration of others using manual muscle testing, to be aware of these parameter changes. The only way to become an expert on evaluation of self and others is to use manual muscle testing and perfect it by testing thousands and thousands of muscles. This tool, like any other quality precision tool, is only as good as its operator. The finest of cameras in the hands of an amateur produces poor quality photographs; yet an inexpensive camera in the hands of a photographer who has studied composition and lighting can produce truly beautiful pictures. In manual muscle testing, we have a tool which can reveal many of the intricacies of body function when used by an experienced tester capable of correlating the test results with physiology.

Many unfortunate things have happened in the use of manual muscle testing. Certainly all muscle testing does not fit into the discipline known as applied kinesiology. Although the International College of Applied Kinesiology is an organization which promotes the creative use of muscle testing to evaluate function, it strongly rejects the use of muscle testing procedures which have not been proven clinically reproducible. Among other things the ICAK discourages are specific types of muscle testing which are poorly reproducible, and "nutritional testing" by holding some supplement in the hand or placing it on the body. Many parapsychological factors appear to possibly make changes in muscle strength, but they are not reproducible at all times for the same individual or for others. For a technique to be in the armamentarium of the discipline of applied kinesiology, it must be reproducible by anyone sufficiently trained in the procedure.

Blind studies have value in determining the reproducibility of procedures and testing methods. This is done by the examiner not being aware of what is or is not taking place which might possibly affect change of muscle strength. For example, if listening to a particular form of music[8] is supposed to consistently weaken an indicator muscle, it should be capable of doing so when the subject hears the music but the examiner does not (for example, when the subject is wearing earphones). A study[18] of this nature was done on the effects of music on muscle strength. The blind study failed to reveal muscles weakening to specific types of music (certain rock bands) as had previously been presented.

Sometimes the examiner can dislike something so much that it subconsciously influences the precision of his muscle testing procedures. This is often observed with white sugar. Some examiners are so opposed to the general use of refined sugar that they find its ingestion causes muscular weakness in every individual. In fact, certain individuals can tolerate white sugar with no immediately observable detrimental effects to their bodies. This same mental influence can be present when the examiner is convinced of the therapeutic importance of a specific technique or nutritional compound. Because of subcon-

2—3. This testing procedure is inaccurate because of the many muscles being tested and the variables present.

scious influence on his muscle testing, he will find that all individuals benefit from that technique or compound.

There are many methods for avoiding the pitfalls described when using manual muscle testing as a diagnostic tool. The most significant assets are thorough knowledge of anatomy and the techniques of muscle testing. It can be observed that those who are often responsible for improper evaluation of muscular strength have only a few muscle tests in their repertoire. They usually use the inaccurate arm pull-down test, which tests a group of muscles, or a simplified test such as the deltoid test. The deltoid test, although apparently simple, has several possible pitfalls. First, it is very difficult to stabilize the patient adequately when in a sitting or standing position. Second, if pressure is applied at the distal aspect of the arm, the examiner has a great leverage advantage and can very easily overpower the patient, especially if timing of the muscle test changes slightly. Third, there is a significant possibility that a problem in the shoulder itself is causing pain, which invalidates the testing procedure. The "leg test" is also frequently used in general muscle testing. Its inaccuracy comes from many variables. Since it tests a combination of the gluteus medius, gluteus minimus, and tensor fascia lata muscles, a slight change of vector may change the prime mover. The examiner may abuse the great amount of leverage. Finally, if pressure is placed at different locations on the foot, possible foot dysfunction can change the results of the test.

In the past ten years, a considerable amount of muscle testing has been taught to lay people, by both qualified and unqualified individuals. This author feels that the teaching is being done by very sincere individuals with the anticipation of helping the student understand his body function for his ultimate benefit. These efforts to educate the lay public in natural health are applauded, and can be very beneficial. However, the teaching of manual muscle testing for the evaluation of body function, and the influences of various treatment modalities, to those who are not knowledgeable and lack the desire to learn anatomy and physiology in depth is detrimental both to them and to the advancement of applied kinesiology as a diagnostic tool. The reason for this stand is the significant abuses observed in the use of what is — in the hands of a qualified diagnostician — a valid diagnostic approach.

Lay education has been done through classes and books written for the lay person. Obviously the classes are better, because they provide the opportunity for observation and practical application of muscle testing. The books often give only one or two muscles to test as "indicator muscles"; these are supposed to evaluate the general effects upon the body of various factors, such as nutritional supplements, various foods, environmental toxins, emotions, etc. Sometimes the books teach that chemical substances, such as nutrition, are evaluated by holding the substance in the hand and testing the muscle. There is no evidence that suggests any reliability in this type of testing.

The primary reason this author is against this form of education and written material is the way in which it is used. In many areas of the country there are health food stores and individuals who sell nutritional supplements in the home, using muscle testing as a sales tool. Many have played silly games with muscle testing at cocktail parties, etc. In fact, one book even recommends the use of muscle testing as "parlor games." Both the inaccurate use and playing games with muscle testing are detrimental to the advancement of the discipline as a valid diagnostic approach.

Unfortunately, many think this inappropriate use of muscle testing is applied kinesiology. It is not. Applied kinesiology is a discipline which requires considerable study, knowledge of anatomy and physiology, and thousands of hours of practice before a high degree of proficiency is accomplished. The International College of Applied Kinesiology will not even consider an individual for examination for diplomate status until he has accomplished 300 hours of post-graduate study under an ICAK diplomate and 5,000 hours of practical experience, and has written two original research papers which are acceptable to the Board of Certification. After becoming Board qualified, he takes a written examination in five subjects, and is then subjected to a rigorous practical examination in which skills must be demonstrated in muscle testing and other examination procedures.

Structural Balance

Origin/Insertion Technique

Manual muscle testing was first used by Goodheart[10] to identify muscle dysfunction involved with poor structural integrity. He observed, on an individual, a weak serratus anticus muscle on one side. The weakness was somewhat paradoxical because there was no observable atrophy of the muscle in comparison to the opposite side. Upon closer examination, palpation revealed discrete painful nodules at the origin of the muscle at the ribs. This finding was not present on the opposite serratus anticus, which had normal strength. To determine if these nodules were a possible trigger point area affecting the serratus anticus strength, Goodheart deeply massaged the nodules and, upon immediate re-testing, found the muscle had returned to approximately 70% the strength of the opposite side. This was the birth of the origin/insertion technique used in applied kinesiology.

Further clinical evaluation for muscle weakness revealed that this same tender nodule aspect was present at the periosteal-tendinous junction of different muscles. When the nodular area was deeply massaged, muscular strength would return and, in most instances, remain. The patient's history often revealed trauma to the area, either recent or chronic in nature. Goodheart hypothesized that

the weakness was due to a microavulsion of the tendon from the periosteum.

This system was used with enough success to interest others in manual muscle testing to evaluate for structural balance. As knowledge has been gained in applied kinesiology, it has become obvious that some of the results attributed to origin/insertion technique may have been the result of stimulation to the Golgi tendon organs, which are proprioceptors located in the tendons of muscles. The origin/insertion technique remains a viable technique in applied kinesiology. Indications for its use are history of trauma to the area and palpable tender nodules at the periosteal-tendinous junction. The Golgi tendon organ, which is discussed under proprioceptors, is located more at the musculotendinous junction; treatment requires a linear factor rather than simple heavy massage.

The heavy massage used in origin/insertion technique possibly strengthens the muscle by vibrotactile stimulation. The alpha motor neuron is facilitated by vibrotactile stimulation as indicated by increase of the F wave[27,24] which is an antidromic volley that excites the alpha motor neurons following peripheral nerve stimulation. It can test the facilitated status of the motor neurons.[22] The well-established effects of vibrotactile stimulation develop from stimulation of less than 100 Hz, which is in the range of digital stimulation.

Exercise for Muscle Weakness

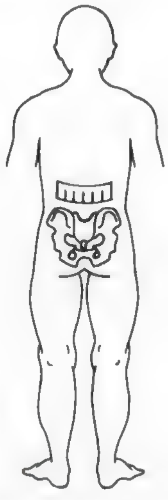
Because of Goodheart's new origin and insertion technique, many chiropractors learned manual muscle testing. Unfortunately, when a weak muscle was found the new technique often provided only temporary results — or none at all. When it did work, it worked well; when it did not work, it created the problem of what to do with the seemingly weak muscle. In the early days of applied kinesiology many persons, including this author, developed specific exercises for patients whose muscular weaknesses did not respond to origin and insertion technique. The results of months of the patient's specific effort were disheartening because the exercise procedures accomplished so little. The dramatic difference between the excellent results of the origin and insertion technique when applicable, and the poor results of specific muscle exercise, was the first indication that manual muscle testing was observing something other than just a weak muscle. There had to be some type of involvement of the muscle's controlling factor, because there was no atrophy or other indication that the muscle should be weak. In many cases when the muscle appears "weak" on manual muscle testing, it still has the ability to generate power as measured by other means. This requires additional investigation.

A new approach to evaluating structural balance had been developed. More importantly, the framework for new discoveries had been laid. Over the years, Goodheart has been the primary individual introducing or developing new techniques to return balance to the muscular system, producing immediate and dramatic results. Today it is seldom that a doctor knowledgeable in applied kinesiology finds a muscular imbalance which cannot be treated effectively.

Hypertonic vs. Weak Muscle

When the origin/insertion technique was effective in returning normal muscular strength, there were dramatic improvements in many of the patients' general health problems as the result of the improved muscle integrity. This experience made those working with muscular balance in the early days of applied kinesiology much more cognizant of the importance of general structural balance. A basic principle emerged, to remain in the forefront of AK understanding of body function. This was the relationship of a muscle which tests weak on manual muscle testing to a hypertonic one.

Muscles which were hypertonic, or in "spasm," had been treated with orthodox methods of diathermy and other forms of heat, ultrasound, massage, etc. With manual muscle testing, it was frequently found that muscles which were antagonists to hypertonic muscles tested weak. Upon strengthening the muscle, the tension in the hypertonic muscle was dramatically reduced without any treatment being administered. It became obvious that many times a



2—4. Structural balance is of primary consideration in applied kinesiology.

2—5. When muscular pull is balanced, structure is balanced.

2—6. If functional muscle weakness is primary, the antagonist contracts from lack of opposition. Generally there will be pain in the contracted muscle.

muscle was hypertonic because of a primary functional weakness of its antagonist. A muscle unopposed contracts from the muscle turgor or tone which is inherent in it. The classic example of a muscle contracting when unopposed is trauma avulsing the tendon of the biceps brachii. The muscle, being unopposed, bunches up in the upper or lower arm, depending upon which tendons are avulsed. Of course, this is an illustration of 100% loss of resisting pull against the muscle. The amount of hypertonicity in a poorly opposed muscle from ineffective antagonist function will be in direct relation to the amount of weakness in the antagonist.

When a functionally weak muscle is found and its antagonist is hypertonic, it is easy to evaluate the effect of strengthening the muscle. First, evaluate the pain in the belly of the hypertonic muscle by digital pressure. After strengthening the muscle with whatever technique is presented in this volume, immediately re-evaluate the pain in the hypertonic muscle. It will often be found that the pain has been dramatically reduced, or removed altogether. A very good combination for evaluating this is a weak latissimus dorsi muscle and a secondarily hypertonic upper trapezius muscle. The patient will generally complain of tension across the shoulders; upon squeezing the belly of the upper trapezius muscle, there will be significant pain. By returning the latissimus dorsi to normal strength, the pain will often be greatly reduced or eliminated.

Expanding Treatment Methods

The use of manual muscle testing to evaluate structural balance opened a new vista to Goodheart and others using it, ultimately ending in a diagnostic system evaluating numerous therapeutic approaches. It was soon recognized that specific muscular dysfunction was a relatively common occurrence in various types of health problems. As knowledge increased, specific tests were developed for the many therapeutic approaches under the diagnostic umbrella of manual muscle testing known as applied kinesiology. Most of the therapeutics used in AK are systems previously developed by innovative pioneers. Nearly all of these approaches have been modified, slightly or extensively, for use in applied kinesiology. The modifications have made the therapies either more effective or easier to administer. It was very difficult to obtain accurate indications of need for some of the therapeutic approaches prior to the introduction of applied kinesiology. A high degree of skill was necessary for evaluation of others. The diagnostic indication available from muscle testing has made a significant impact on many different types of therapeutics which appeared to have significant value, but were not popular because of the difficulty in determining when their use was indicated.

Most of the innovative ideas in applied kinesiology have come from Goodheart, laying the foundation for advancement. A trend is rapidly developing for new minds to become interested in AK, magnifying the advancement not only in ideas, but also in better understanding of the mechanisms involved.

The advent of the International College of Applied Kinesiology in 1975 brought organization to this new discipline. Members are encouraged to present papers at the semi-annual meetings of the College, and diplomates are required to present a minimum of one paper per year. All papers presented are published in book form for the members of the ICAK. They are frequently involved with the evaluation of hypotheses previously presented in AK.

Applied kinesiology is taught by diplomates of the ICAK. They are required not to teach any material as standard applied kinesiology that has not been shown to work consistently for anyone trained in the therapeutic approach.

Five Factors of the IVF

As Goodheart continued to find therapeutic approaches which affected muscular strength, he delineated five primary factors under which most of these approaches fall. These are nervous system, lymphatic system, blood vascular system, the acupuncture meridians, and cerebrospinal fluid circulation. Because all these factors are evident at the intervertebral foramen, they became known as the five factors of the intervertebral foramen, or the five factors of the IVF.

Nervous System

The nerve aspect has many ramifications. The nerve at the intervertebral foramen is associated with vertebral subluxations and fixations, but the neurologic aspect goes much deeper. Subluxations of the extraspinal articulations create neurologic disturbances from improper stimulation of the joint proprioceptors. Other proprioceptors throughout muscle and skin and those related to equilibrium are evaluated with applied kinesiology methods. The cranial nerves are disturbed by improper cranial respiratory function. The different functions of the right hemisphere — as opposed to the left hemisphere — have more recently been brought into AK evaluation. Nutrition and various chemical effects on the body are evaluated in applied kinesiology by way of the nervous system. Many other examples of how the nervous system is significantly interrelated in the diagnostic functions and therapeutic processes used within the framework of applied kinesiology could be given; however, they are covered in the appropriate places in these textbooks.

Lymphatic System

The lymphatic system is influenced by techniques used in applied kinesiology. Some of these deal with structural distortion blocking the lymphatic ducts, while others correlate with the lymphatic pump of the capillaries. The lymphatics are hypothesized to correlate with the inter-

vertebral foramen, with both having an intercommunication with the cerebrospinal fluid[7] and with reflexes which are adjacent to the spinal column and influence lymphatic drainage in various areas of the body. These reflexes are also located on the anterior portion of the body. They are discussed later as neurolymphatic reflexes.

Vascular System

The vascular system relates to many types of neurologic reflexes, mechanical blockages, and pathologic conditions resulting from chemical imbalances within the body. Blood pressure, for example, can be influenced by any of these factors. Reflexes which are used in applied kinesiology and appear to influence the capillary bed are referred to as neurovascular reflexes, and are discussed later.

Cerebrospinal Fluid

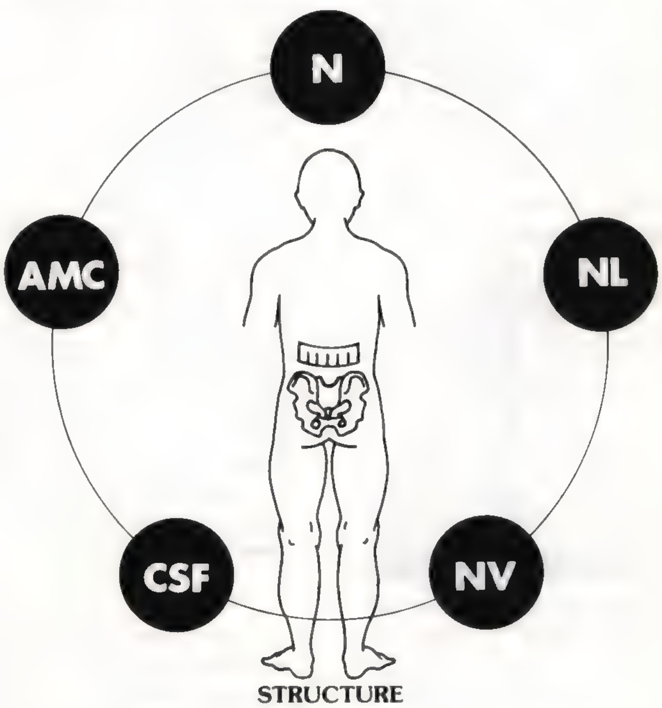
Cerebrospinal fluid function appears to correlate to a cranial-sacral primary respiratory system. Correct pressure, production, and flow are necessary for normal health to be present. (This subject is discussed in depth in Volume II of this series.) There is significant evidence that normal motion of the cranial-sacral primary respiratory system is necessary for optimum nerve and cerebrospinal fluid function.

Meridian System

Making up the last of the five factors of the IVF is the meridian system. Goodheart listed it with the intervertebral foramen because of what he calls acupuncture meridian connectors. These are the associated points of meridian therapy lying alongside the vertebrae bilaterally on the bladder meridians. There appears to be a very significant intercommunication between these points and the vertebrae. A persistent subluxation can cause an associated point to become active; conversely, a persistently active associated point can create a vertebral subluxation.

Thus we have the five factors of the IVF. These factors are all interrelated; it is impossible to separate them. This is an important principle in applied kinesiology — the body functions as an integrated whole. One factor is capable of either improving or causing problems with another factor. An individual may have trauma, chemical, or psychological stress which influences one of these factors. If allowed to persist, other factors will ultimately become involved, making the individual's condition more deeply rooted. The additional ramification of chronicity makes the condition intolerable, or an actual pathological state develops. At some time during this developmental process, the individual requires assistance with his health problem. He will find either a doctor who seeks to remove the basic underlying cause of the problem so that the body can return to a state of health, or a doctor who gives him relief by treating the symptoms. The latter doctor fails to find the underlying cause, allowing the condition to continue and symptoms to return, or to manifest itself as a new problem elsewhere in the body that is still unrelated to the actual primary factor. The doctor's profession makes no difference. There are those in the natural healing arts and in allopathic medicine who consistently find the basic underlying cause of conditions. There are doctors in the natural healing arts and in allopathic medicine who consistently treat the symptomatic problem, failing to find the primary cause.

The five factors of the IVF have become a part of the logo of applied kinesiology as a circle around a man symbolizing structural balance. On this circle are five smaller circles, each symbolizing one aspect of the five factors of the IVF.



2—7. Five dots represent the five factors of the IVF.

Muscle-Organ/Gland Association

Early in applied kinesiology Goodheart[11] observed a fairly consistent relationship of weak muscles with specific organ or gland dysfunction. He noticed that when an organ or gland was in a state of dysfunction, there was nearly always a specific muscle or group of muscles which would be weak when tested by manual muscle testing. As the function of the organ or gland improved, the associated muscle would strengthen.

The associated function of the muscles, organs, and glands of the body has become a very important diagnostic aid in applied kinesiology evaluation. This interrelation appears to be connected in many ways by the complex interworkings of the numerous body control mechanisms and energy patterns. Goodheart's original observations became more firmly implanted as knowledge in applied kinesiology grew. In the early days of AK, there were only a few methods known to strengthen muscles. As various therapeutic disciplines were found to influence muscle strength, it was also observed that symptoms from the associated organ or gland improved.

By observing a specific muscle-organ association, we can see how the correlation developed through the introduction of new disciplines. The clavicular division of the pectoralis major muscle is associated with the stomach. The first therapeutic approach that recognized this association — other than simply correlating a pectoralis major (clavicular division) weakness with stomach problems — was Chapman's lymphatic reflexes. Chapman, an osteopath, used these reflexes to enhance lymphatic drainage of organs and glands. The Chapman reflex which influenced the clavicular division of the pectoralis major muscle was the stomach reflex. In applied kinesiology, Chapman's reflexes are referred to as neurolymphatic reflexes. These were correlated with muscular weakness by Goodheart[11] in 1965 for muscle-organ/gland associations throughout the body.

Shortly after the lymphatic reflexes were introduced into applied kinesiology, Goodheart correlated Bennett's reflexes.[12] Bennett was a chiropractor who organized a system of skin reflexes to influence circulation to organs and glands, and to influence specific body function. The Bennett reflex found to affect the pectoralis major (clavicular division) was the "emotional reflex." Here we don't find a specific paralleling of Bennett's reflex with the stomach; however, the recognized association of emotional factors and stomach function may help resolve this apparent discrepancy.

A few years later the acupuncture meridians were introduced into applied kinesiology by Goodheart.[13] This additional information made a significant contribution to the muscle-organ/gland association. At times it would be obvious that an organ or gland was functioning improperly; however, the muscle which so frequently tested weak in the presence of the dysfunction would test quite strong. The energy patterns of the meridians brought an explanation of this in some cases. A meridian can be out of balance, having either too little or too much energy flow. When the energy level in the meridian is deficient, an associated muscle will test weak; when the energy level is excessive, the muscle will test excessively strong, possibly to the point of hypertonicity. Muscles which are weak are easily identified with manual muscle testing, while overly strong muscles are more difficult to identify. Several techniques have been developed in applied kinesiology to identify these overly strong muscles. These are discussed in the various sections on meridian therapy, proprioceptors, etc. The meridian affecting the pectoralis major (clavicular division) is the stomach meridian.

Chemical interrelationships have also been correlated with the muscle-organ/gland association. Under chemical factors, nutrition — such as vitamins, minerals, and glandular factors — is included, as well as chemical compounds such as medications and environmental pollutants. Again, the muscle-organ/gland association has been supported. The chemicals that affect specific muscular strength are generally associated nutritionally or chemically with the gland or organ which was previously associated with the muscle affected by the chemical. In the illustration we have been using — the pectoralis major (clavicular division) — oral administration of hydrochloric acid will often change a bilateral weakness to strength.

Throughout the development of applied kinesiology, it has been interesting to observe the continuing enhancement of the muscle-organ/gland association. Many who were using AK techniques in their earlier development were aware of the common association, yet there were times when perplexing contradictions to the apparent association appeared. A patient might have a pyloric ulcer, yet the pectoralis major (clavicular division) would appear normal on manual muscle testing. As more knowledge was acquired in AK, these apparent contradictions to the muscle-organ/gland association became less frequent. Today there are very few occasions when a lack of understanding of the associations occurs. Many of the apparent contradictions were not contradictions at all; they were the examiner's inability to find a hidden pattern present as a result of the body attempting to repair a pathology or compensate for a dysfunction.

The applied kinesiologist is constantly observing additional supportive evidence of the muscle-organ/gland association. An examination typically reveals many correlative factors that support the findings of the examination. A typical example is an individual who has a sacroiliac subluxation, a weak sartorius, and relative hypoadrenia. In applied kinesiology, the adrenal gland is associated with the sartorius muscle. The sartorius muscle is an anterior stabilizing muscle to the pelvis. In the presence of a sacroiliac subluxation where the posterior superior iliac spine has moved posterior and inferior, there will typically be a dysfunction of the sartorius muscle, which apparently allows the subluxation to develop by inadequate anterior support to the ilium. All indicators of the subluxation may be removed by manipulation, but often, if the sartorius is not returned to normal function, the subluxation will return immediately when the patient walks. The sartorius muscle may be strengthened by various methods designed to improve adrenal function, one of which may be nutritional support. In the presence of the weak sartorius and the

sacroiliac subluxation, there is usually significant tenderness at the origin and insertion of the sartorius muscle. This tenderness will frequently be immediately removed when the patient chews nutritional factors for the adrenal, such as adrenal gland concentrate or nucleoprotein extract. Support of the adrenal-sartorius-sacroiliac association is observed when the patient's sacroiliac dysfunction has been stabilized to normal for some period of time. An exacerbation of the sacroiliac subluxation can occur as a result of significant adrenal gland stress, such as an acute hypoglycemic episode. In this case, the sartorius dysfunction, tenderness at the origin and insertion, and sacroiliac subluxation will return. Again, support to the adrenal gland will improve the condition.

A study of four muscle-organ associations was done by Carpenter, Hoffmann, and Mendel[4] at the Anglo-European College of Chiropractic. They chose to use apparent irritants to four organs — the ear, eye, lung, and stomach. The muscles associated with the organs in applied kinesiology were tested before and after the apparent irritation, using a spring tension meter. Various apparatuses were devised to test the different muscles under study. The patient, in isotonic contraction, pulled against the spring tension meter, and the examiner read the maximum contraction. In this case, results of the muscle test would be actual failure of the muscle to generate power, inasmuch as the testing was not that of a muscle being taken from isometric to eccentric contraction, as is usual with manual muscle testing.

To irritate the ear, sound from a white noise generator calculated at a frequency and decibel level for irritation was used. The muscle associated with the ear, the upper trapezius, was tested. For the eye, chemical irritation in the form of chlorinated water was used and, again, the upper trapezius muscle — associated with the eye — was tested. The lung was irritated with cigarette smoke and its associated muscle, the deltoid, was tested. The stomach was subjected to two imperial pints of cold water and the pectoralis major (clavicular division) was tested.

Muscles not associated in AK with the irritated organ were tested as control muscles. Also, other subjects were studied with the same protocol, but without organ irritation. These constituted a group to determine if the testing protocol could cause muscular weakening without organ irritation. The results of the research suggested a weakening of the muscles which were associated with the irritated organs. There was also a weakening, to a lesser extent, of the control muscles in the same subjects. The subjects who were tested without organ irritation showed no muscle weakening.

An interesting side finding of this research was the moderate weakening of the control muscles in the group whose organs were irritated. Even though the weakening was not as great as that of the muscles actually associated with the organs, it showed that an insult to the body may affect the body's general muscular function. This parallels the AK finding that a general muscle of the body will weaken when different forms of insult are administered to the nervous system. When a general muscle weakens as a result of a testing procedure, it is called an "indicator muscle."

Obviously, further research needs to be developed in the study of the muscle-organ association. It is apparent that there is an association between muscle function and that of organs and glands. The association is an extremely complex one due to common nerve supply, meridian energy, lymphatic drainage, and vascular supply; it also has a chemical correlation. The known associations are valuable diagnostic aids. Typically, when there is organ or gland dysfunction, there will be dysfunction of the associated muscle; the muscle is either weak or excessively strong. On the other hand, where there is muscular weakness or hypertonicity, there is not necessarily an organ or gland dysfunction; however, it does give indication that the possibility of dysfunction of the associated structure should be considered.

This is similar to many other diagnostic indicators about which the physician is knowledgeable. The characteristic coloring and fatigue of anemia does not necessarily mean the patient has anemia, but it does alert the physician to that possibility. An individual who has a bleeding ulcer will not always have anemia, but evaluation for it should be made. This parallel is present in the muscle-organ/gland association of applied kinesiology. The association gives valuable clues leading to a final diagnosis, but it is not an end in itself.

With increasing knowledge in applied kinesiology, there is increasing strength for the argument of muscle-organ/gland association. When there was a lack of correlation in the past, there was insufficient knowledge to uncover what was, in effect, a hidden correlation. In other words, the muscle-organ/gland association was present in specific organ or gland pathologies, but it was not evident to the examiner because of factors of which he was unaware. Many of these factors are a result of the body's constant effort to be a self-maintaining, self-correcting mechanism. When the controlling or energy pattern of an organ, gland, or muscle is inadequate and a disease process results, the body will attempt to supplement that control or energy pattern to regain health in the area. This will cause the muscle function to appear normal, yet the efforts of the body have not been successful in correcting the condition. In fact, they may never be able to correct the condition. Evaluation methods are available in applied kinesiology to find most of these compensating patterns.

Even with the improved evaluation procedures in today's applied kinesiology, there are still times that the body's complex energy and control patterns cannot be thoroughly understood. As a result, it appears there is a lack of correlation of the muscle-organ association. It seems evident from past knowledge that as research continues, apparent discrepancies will be understood. The key factor, of course, is for those involved in AK research to continue their attempts to find the reasons for these occasional discrepancies.

The muscle-organ correlation has many uses. Often the association is very obvious, and evaluation is made as to what therapeutic approach will improve muscular function. If, in fact, the muscle dysfunction is from the same cause as the organ or gland dysfunction, the same therapeutic approach that improves the muscle will also improve the organ or gland function. Clinical results have shown

this to be a very effective method of finding the correct nutritional, neurologic, and/or reflex therapeutic methods for functional disorders.

The muscle-organ/gland association is also valuable in providing many types of body language which accompany different types of health problems. For example, a patient may complain of digestive gas. The physician knows many factors that give him clues as to whether the gas is from gastric hypochlorhydria, small intestine, or colon dysfunction. The time the gas develops in reference to a meal, types of food that cause more gas, characteristics of the gas pain, etc., are all important factors. The physician can add clues to his investigation by knowing that the stomach is associated with the pectoralis major (clavicular division), the small intestine with the abdominal and quadriceps muscles, and the colon with the tensor fascia lata. During consultation and examination, the physician observes that the patient needs to use his hands on his thighs to get up from a chair because of quadriceps weakness. Further muscle testing of the pectoralis major (clavicular division) shows normal strength, as does the tensor fascia lata. Normal function of the pectoralis major (clavicular division) and the tensor fascia lata helps to rule out involvement of the stomach or colon. If all factors correlate to a small intestine involvement, the physician can use the muscular weakness of the quadriceps and abdominals to find what therapeutic measures improve the muscular strength, be they neurologic, lymphatic, nutritional, vascular, etc. The therapeutic measure that improves muscular function will probably also influence the nerve or endocrine control of the small intestine, or may influence an energy pattern such as the meridian system. This information adds another facet to the diagnostic capability of the doctor.

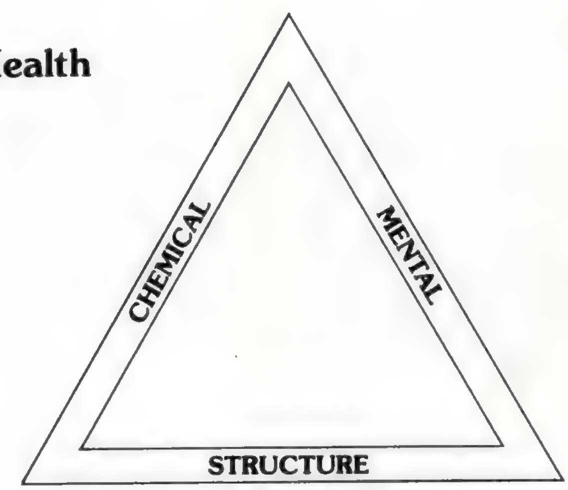
Frequently a patient will develop symptoms from an organ or gland dysfunction which are secondary to a muscular stress. The example that follows describes a sequence of events that is not uncommon. A patient falls, or otherwise causes a sacroiliac subluxation. If a sacroiliac ligament is irritated by a subluxation such as the posterior superior iliac spine in a posterior inferior position, the sartorius and gracilis muscles attempt to make mechanical correction of the pelvis. If they are unable to accomplish this correction, they are consistently under stress. The sartorius and gracilis muscles are associated with the adrenal gland. Continued stress to these muscles can activate the neurolymphatic reflexes, neurovascular reflexes, or the associated meridian, thus causing a functional problem in the adrenal gland. As a result of the secondary adrenal involvement, symptoms may develop from adrenal hormone inbalance. The adrenal dysfunction cannot be corrected permanently until the sacroiliac subluxation has been corrected.

On the other hand, as has been mentioned, this is a two-way street. If a patient has a significantly poor diet or other form of stress which is affecting the adrenal gland, the energy and controlling patterns to that gland may ultimately cause weakness of the sartorius and gracilis, which will then fail to adequately support the anterior superior portion of the innominate bone. As a result, a sacroiliac subluxation is very likely to develop spontaneously or with mild trauma. Repeated adjustment of the sacroiliac will give only temporary results until the energy and controlling patterns of the adrenal gland are returned to normal. Again, the muscle-organ association gives the physician knowledgeable in this relationship an understanding of the mechanisms taking place.

The interrelations of the muscle-organ/gland associations are not fully known. For example, it is known that the adrenal gland is associated with the gastrocnemius and soleus as well as the sartorius and gracilis. Which muscle or muscles will become involved with adrenal dysfunction cannot be predicted. Only one of the four muscles may be weak, and then only on one side of the body. The pattern of the muscle-organ association is well-established, but it has variables which are not thoroughly understood. Those who are advanced in applied kinesiology investigation continue to find additional patterns and subtleties in this association. As more is learned about these associations, there will be greater understanding of the control mechanisms and energy patterns of the body.

Triad of Health

The triad of health lists the three basic causes of health problems. They are structural, chemical, and mental, with structure as the base of the triad. Literally, all health problems, whether functional or pathological, are involved with one part or all of the triad. This is not new to chiropractic, as its founder, D. D. Palmer stated in his text, *The Science, Art, and Philosophy of Chiropractic,* "The determining causes of disease are traumatism, poison and autosuggestion."[19] In another part of the book he stated, ". . . Disease may be caused by injuries or poisons or from the mind." Harper,[16] Homewood,[17] and others have expanded on Palmer's writings in regard to the triad of health, showing how each side can cause vertebral subluxations with health problems following. The physician who is aware of the triad of health, and evaluates every



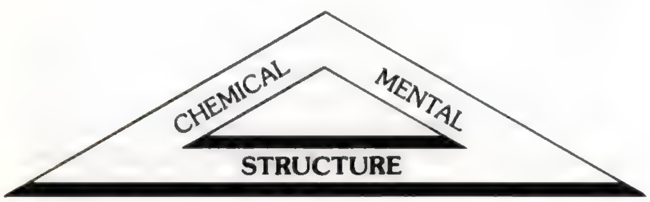
2—8. Triad of Health

patient for all three sides, increases his ability to find the basic underlying cause of a patient's health problem. Unfortunately, most professionals in the health care system do not thoroughly evaluate for influence of the different aspects of the triad on the patient's chief complaint. Rather, they tend to stay on the side of the triad associated with their specialty.

Each side of the triad is represented by one or more specialties in both natural health care and allopathic medicine. Often, individuals in a specialty attempt to influence the other two sides of the triad by treatment in their area of expertise, creating a lopsided triangle. The efforts may be symptomatically effective, but they often do not give attention to the basic underlying cause of the patient's chief complaint.

Structure

Structure is represented in natural therapeutics by chiropractors, rolfers, massage therapists, and sometimes osteopaths. Orthopedic surgeons, podiatrists, physiatrists, electrotherapists, and dentists represent the allopathic approach to structure.

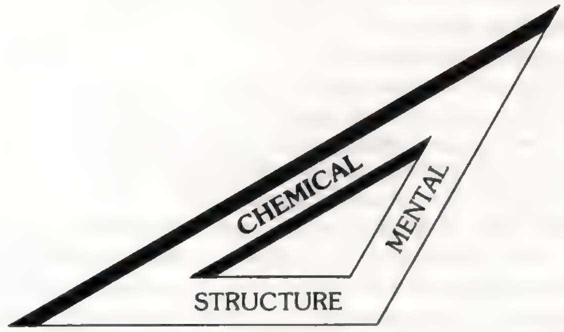


2—9. Chiropractors?

Direct physical trauma is often the reason for consulting a structurally oriented health care provider. This is when the therapeutic approach of the structurally oriented is outstanding. The surgeon repairs the damage, the chiropractor corrects the subluxations, and all is well. Unfortunately, many times the patient's chief complaint — a structural problem — originated on another side of the triad. This is when the structurally oriented professional obtains no improvement, or gets improvement only to have the condition return. If the structural stress is secondary to a mental or chemical stress, all structural approaches will be either unsuccessful or temporary until the mental or chemical stress is removed. There are many mechanisms by which mental and chemical stress can affect body structure. A classic example is functional hypoadrenia, which in turn affects the sartorius and/or gracilis muscle strength. These muscles are very important anterior stabilizers of the pelvis; when weak, they allow structural strain to develop.

Chemical

The nutritionist represents the natural approach to the chemical side of the triad, while medications represent the allopathic approach. There are times when the nutritionist uses an allopathic approach in the name of nutrition.



2—10. Allopathy/Nutrition?

Whenever high concentration megavitamin dosages are given to create specific counteracting effects in the body, the approach ceases to be nutritional and comes under the allopathic concept. Examples of this are megavitamin dosages of niacin and B_6 for the treatment of schizophrenia, megavitamin dosages of vitamin C for its various uses, and high concentrations of iodine for hypo- or hyperthyroidism.

Some substances used by nutritionists are not nutrition; they are substances not found in natural food supplies but are, rather, those which the body should be able to manufacture. An example of this is hydrochloric acid.

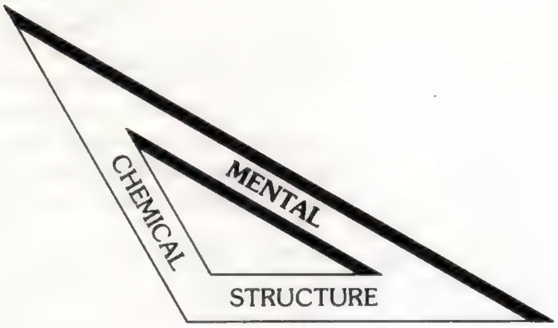
The nutritionist can improve numerous factors in an individual's health by correcting his diet or prescribing nutritional supplements lacking in his diet. There may be obvious nutritional deficiencies which the nutritionist cannot improve by diet or nutritional supplementation if there is malabsorption in the gut from neurologic imbalance of either a mental or structural background, or genetic enzyme deficiency.

There are many instances when allopathic medicine directly attacks a problem. Hormone replacement in the form of thyroid or estrogen may be necessary in certain types of conditions. Yet the continued use of steroids to control allergies, when there is etiology of relative hypoadrenia from the structural, mental, or chemical side of the triad, gives only temporary relief and may cause iatrogenic problems. The use of antibiotics when massive burns are lowering resistance is a life-saving device. On the other hand, if an individual has lowered resistance to bacterial infection from relative hypoadrenia secondary to mental or structural stress, those sides of the triad must be approached for a permanent correction.

Mental

Psychologists, counselors, and ministers represent the natural approach to the mental side of the triad, while psychiatrists tend to represent the allopathic approach by using medications, shock therapy, etc.

The practitioner concentrating on the mental side of the triad of health can have significant successes affecting many health problems. When counseling teaches an individual to better understand his job and family, his mental attitude is changed. This may improve adrenal function



2—11. Psychologists/Psychiatrists?

affecting numerous health problems. If, however, an individual has significant depression as a result of functional hypoglycemia, results will be dismal until the physiologic condition is corrected.

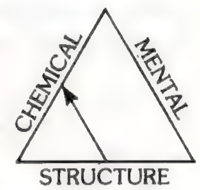
INTERPLAY BETWEEN THE SIDES OF THE TRIAD

Examples of interplay between the sides of the triad of health are illustrated here. Throughout applied kinesiology, the triad of health is an important principle evaluated in all types of conditions. It is of paramount importance because nearly all conditions, especially if chronic, involve all three sides of the triad. The physician must consider all possibilities so that he is not treating secondary effects rather than primary causes. An accurate consideration — almost a rule — is that the more chronic a condition, the more involved it is with the three sides of the triad. Even simple acute conditions, such as a sprained ankle — which is obviously structural only — can ultimately affect other structures throughout the body if not treated correctly, and eventually the chemical and mental sides of the triad. Treating the sprained ankle correctly entails follow-up evaluation for structural balance and normal nerve function in the foot after the obvious tissue damage from the sprain has been repaired.

By taking specific examples of the interplay between the sides of the triad, the importance of the doctor consciously considering the possibility of this interplay with each patient complaint can be seen. This evaluation is necessary not only to solve the patient's chief complaint, but like the system's review, to help find hidden problems of which the patient may be unaware. Unfortunately, many patients will not discuss a specific condition because they do not feel that it is important; in fact, they may consider the condition as a normal factor which will go away when "I get over the stress I'm under," etc.

The following examples concern a patient coming in with a specific chief complaint. In addition to the complaint, there is a digestive disturbance which manifests itself as gas, occasional burning, and other various, vague complaints. The patient chooses not to discuss these with the doctor. He has been under considerable stress recently, and has been keeping it symptomatically tolerable by using over-the-counter antacid preparations (as advertised on television). These examples will illustrate the primary cause, secondary effects, and how hidden health problems are often uncovered by considering all factors of the triad of health.

Structure Affecting Chemical



Chief complaint: headaches. This illustration develops a hypothetical situation with more interplay than previously described. The case is typical of chronic health problems and how only a portion of a problem may be improved because of a lack of thoroughness.

Background: one year previously the patient sprained an ankle which apparently healed successfully. Unknown to the patient or his physician, there were subluxations of the foot and ankle which improperly stimulated the proprioceptors when standing, walking, or running. This improper proprioception caused structural stress in the suboccipital area as a result of improper facilitation and inhibition of the upper trapezius, sternocleidomastoid, and other muscles active during walking and running. The patient began noticing mild suboccipital headaches, but they would go away after a good night's rest. The continued imbalanced pull of the muscles into the cranium eventually caused cranial faults, which interfered with normal vagus nerve activity. This in turn reduced the secretion of hydrochloric acid. The reduction of hydrochloric acid reduced pancreatic enzymes, and poor digestion and resulting toxicity developed. As the patient grew more toxic, the headaches became more generalized and severe in intensity, to the point that now they are almost constant.

This snowballing effect is a relatively common occurrence in many types of health problems. Already the relatively simple structural problem has affected the chemical side of the triad of health. If this patient is allowed to become chronic with severe headaches, he will probably do poorly at his job and possibly have family problems, which ultimately would affect the mental side of the triad.

Doctors specializing in one side of the triad can fail to find the primary cause because treatment directed to one side of the triad may give only partial results. A chiropractor may examine this patient, find the suboccipital stress, and give partial results with upper cervical adjustments which relieve that portion of the patient's headache. A nutritionist might find the gut problem, administer hydrochloric acid and enzymes, and start a detoxification program. This would also give results, but not of a permanent nature. The illustration could go on with various forms of therapeutics.

There are many doors for entering the patient's health care. The answer is to have a system that evaluates all three sides of the triad of health, to determine when corrections are obtained and if the body is capable of maintaining the corrections. The chiropractor who reduced the

headache with cervical manipulation would find that as soon as the patient walked, the corrections obtained would be lost. The nutritionist used nutrition as an allopathic approach and did nothing to eliminate the cause of the reduced hydrochloric acid secretion, which in turn caused the lack of enzymes and toxic gut.

The dynamic evaluation which finds the problems and then evaluates the patient to determine if corrections are maintained is the answer to ultimately finding the primary cause, which is in the foot and ankle. The procedures in applied kinesiology evaluation can easily track down the foot involvement, which is the basic underlying cause of this patient's problem.

Chemical Affecting Structure

Chief complaint: low back pain.

In this case there is no significant history to be obtained from the patient. He denies injuring himself and states the backache "just seemed to start." He used to get relief periodically but now it is there all the time. As with all these examples, the patient has a digestive disturbance that he chooses not to discuss with the doctor, or fails to recognize as a problem.

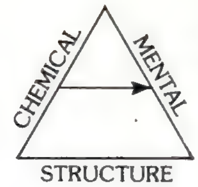
This patient has a very poor diet, high in refined carbohydrates and low in roughage. Over a period of time he has developed a malabsorption syndrome from mucous congestion between the villi of the small intestine. The small intestine is associated with the abdominal muscles, as well as the quadriceps group. The abdominal muscles are very important to anterior pelvic stabilization. When weak, they allow the pelvis to rotate anteriorly, increasing the lordotic curve of the lumbar spine and jamming the facet articulations. The oblique abdominal muscles also give pelvic stabilization to prevent twist, important in preventing sacroiliac dysfunction.

A chiropractor can manipulate the lower spine and pelvis with some success. An orthopedist may brace the pelvis with some success. But the key is to find out why there is structural imbalance of the pelvis and lumbar spine in the first place. The only satisfactory approach to this condition is to find the bowel involvement and return the diet to normal. It will probably be necessary to directly treat the digestive system as well. Cheraskin and Ringsdorf[5] discuss the proneness of nutritionally deficient individuals toward musculoskeletal disease. These researchers have found ". . . it would appear that subjects with musculoskeletal symptoms and signs are more apt to be consuming relatively more refined carbohydrate foodstuffs than those free of such clinical findings." They also show that the lack of certain other nutritional factors causes an increased incidence of musculoskeletal problems. Returning nutrition to normal would lead to a decreased incidence of musculoskeletal problems.

Chemical Affecting Mental

Chief complaint: depression.

A similar example to that above is an individual on the

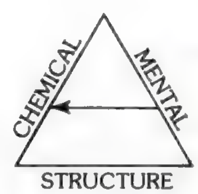


same poor diet, high in carbohydrates and low in roughage. With the malabsorption syndrome he develops relative hypoglycemia, which is a common condition causing depression. Counseling or medication may give temporary relief, but again, until the digestive disturbance is corrected, the primary cause has not been treated.

There are many other ways that the chemical side can affect the mental. Doctors who work with orthomolecular psychiatry have found that food additives can put certain susceptible people into acute psychiatric problems. Often when chemical affects mental there is also a structural side involved. Most people who are extremely susceptible to food additives have frank allergies which are causing the problem. Applied kinesiology evaluation methods find the basic underlying cause of allergic reactions, which are quite often involved with the structural side of the triad. So we see structural problems causing allergies, in turn causing increased susceptibility to chemicals, and finally causing mental health problems.

Mental Affecting Chemical

Chief complaint: menopausal symptoms of hot flashes and severe fatigue.

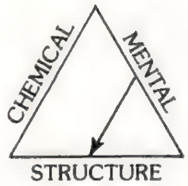


The patient has severe emotional stress due to an alcoholic husband, and the same digestive disturbance used in the other illustrations is also present. The patient feels the digestive disturbance is secondary to the emotional stress, which she does not choose to discuss with the doctor. From another doctor she is receiving hormones for her menopausal symptoms, which is treating the condition on a secondary basis.

Normally at menopause the adrenal glands increase their production of estrogen for a maintenance function. In this woman's case they are incapable of doing so because of relative hypoadrenia, secondary to the mental stress. The relative hypoadrenia is also the causative factor of the fatigue, which is listed as part of the chief complaint. Recognition of the various forms of stress as outlined by Selye,[21] and their effects on the adrenal gland, gives the doctor knowledgeable about the interplay of the triad of health the ability to find the primary cause of the menopausal symptoms and fatigue, regardless of the patient's willingness to discuss them. Correction of this problem is a referral to Al-Anon, or other counseling, which will help bring the emotional stress under control. Dietary regulation, nutritional supplements, reduction of any other forms of stress, and evaluation of the five factors of the IVF will aid in returning the condition to normal as quickly as possible. Unless the primary emotional disturbance is removed, results will not be complete. Interestingly, as the adrenal glands begin to function in an improved manner, the patient will probably have an increased ability to control her emotional stress. Frequently when there is a relative hypoadrenia the blood sugar level drops to an unacceptable low. When this happens, mental processes

are reduced and the subject has difficulty coping with any problems which may be present.

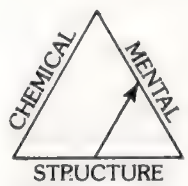
Mental Affecting Structure



Chief complaint: lower back and leg pain.

The history of this patient is similar to the one above — an alcoholic husband, and she has colitis. The patient recognizes that the colitis correlates with the emotional disturbance. It is being treated by another physician, who prescribed a bland diet. She does not mention the colitis or emotional disturbance because she is seeking help for her lower back and leg pain from a structurally oriented doctor. Chronic colitis will often cause a weakness of the tensor fascia lata muscle by activation of the neurolymphatic reflex affecting both the colon and the muscle. A reflex subluxation around the second or third lumbar may also develop. The structural imbalance of the pelvis and leg as a result of the tensor fascia lata muscle weakness, as well as the subluxation, will cause back pain. The structurally oriented doctor may obtain temporary relief by manipulation or mechanical support to these areas. He will not obtain permanent results unless the emotional cause of the condition is brought under control.

Structure Affecting Mental



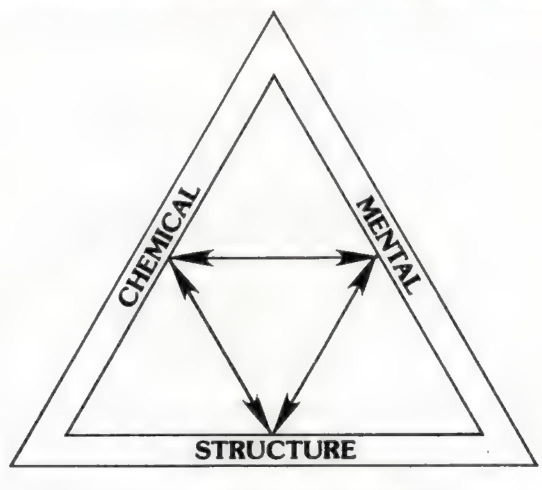
Chief complaint: schizophrenia.

The patient was in an auto accident several years ago which seemed to be the beginning of several general health problems, including the mental aberrations eventually diagnosed as schizophrenia. For those new to applied kinesiology, this interrelation between mental and structure may be difficult to understand. It is more thoroughly explained in applied kinesiology literature[15, 25, 26] and in Volume V of this series. It is used here as an illustration because the therapeutic approach is unique to applied kinesiology and produces excellent results.

In the illustration, the auto accident created a structural imbalance of the pelvis. As a result of this imbalance, proprioceptive communication to the rest of the body became disorganized, developing into what is known in AK as a homolateral crawl pattern, which Goodheart[14] recognized as being present in schizophrenics. The pelvic distortion in the patient also created constant stress to the sartorius and gracilis muscles, ultimately affecting their glandular association, the adrenals. Hypoadrenia is quite important in blood sugar regulation. Fredericks[9] stated that approximately 60% of schizophrenics have hypoglycemia. Schizophrenia is like all other conditions. There is always a causative factor; it remains to be found for correction of the condition. In this case, the chemical and structural sides of the triad must be corrected to eliminate the mental factor.

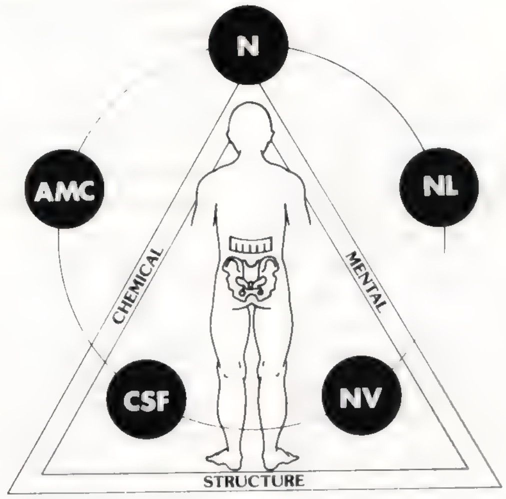
There is a definite lack of knowledge in the general health care field regarding how significantly structure affects mental health. It is of value to mention a few other approaches which have value with structural therapeutics over mental. Rolfing, as described by Ida Rolf,[20] has been used extensively by its practitioners for influence over psychological problems. Reichian therapy[2] treats mental disorders by structural corrections and body stimulation. It appears to be having a revitalization in some areas. Alexander[1] did not accept people with health problems as patients; he acted as a teacher and accepted pupils to learn the correlation of the psycho-physical. He taught the economical use of body functions. Aldous Huxley said about Alexander's technique: "If you teach an individual first to be aware of his physical organism, and then use it as it was meant to be used, you can often change his entire attitude toward life and cure his neurotic tendencies . . .." John Dewey, one of the founding fathers of scientific philosophy in modern education, said that "all of the 'psychic' complexes have their basis in organic discoordination and tensions, with compensatory flabbinesses . . . and (Alexander's) technique is a technique for resolving and unraveling those, reducing the present technique of the psychoanalyst to an incidental accompaniment, and cutting out the elaborate ritualistic mummery with which the present psychoanalysts have been obliged to surround their method. In addition, Mr. Alexander's technique unravels the kinks and complexes by a process of positive replacement in which sound coordinations are built up with their corresponding alterations and habitual sensory and emotional data, while at the best the psychoanalysts merely untie a knot and leave the organic causes which produced it untouched."

All of the illustrations used in this interrelationship of the triad of health are examples from daily experiences in applied kinesiology. It is obvious that attention must be given to each side of the triad. It is unusual to find a patient with a chronic health problem who does not have, to some extent, all three sides of the triad of health involved. The physician's challenge, regardless of therapeutic interest, is to find the primary involvement so that the basic underlying cause of the problem can be corrected. Certainly some



2—12. An interplay between sides of the triad of health is the best approach.

of the secondary effects may also need treatment to enhance speed and completeness of recovery. If the primary cause is not within the physician's therapeutic armamentarium, it is his obligation to refer the patient to the appropriate practitioner who can provide the necessary treatment.



"Man possesses a potential for recovery through the innate intelligence of the human structure. This recovery potential with which he is endowed merely waits for your hand, your heart, and your mind to bring it to potential being and allow the recovery to take place which is man's natural heritage. This benefits man, it benefits you, and it benefits our profession. Do it, do it with knowledge, do it with physiological facts, do it with predictable certainty, do it because it has to be done, and we as a profession are the only ones who can do it effectively."

— *George J. Goodheart, Jr., D.C.*

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Chapter 3

General Examination Procedures

Introduction

The examination procedures of applied kinesiology are really its essence. The basic therapeutic procedures used within the framework of applied kinesiology are primarily therapies that have been used by numerous disciplines in the healing arts. Certainly some new therapeutic approaches have been developed in applied kinesiology, because AK evaluation uncovers conditions for which no specific therapeutic approach has been devised. These methods have been tested and refined through common clinical usage. The primary advantage of AK is its ready capability of finding a problem, determining what type of correction is of value, and, finally, ascertaining if correction is obtained.

It is reasonable to consider that the body works as a totally integrated whole. Because so much knowledge has been developed in the healing arts, doctors have tended to specialize. (This has been discussed previously under the "Triad of Health.") It would seem to many that an evaluation system concerned with investigating all aspects of the interrelations by which the body functions would be very difficult to master; in reality, the opposite is true. As more is learned about the interaction of body function, an examination becomes easier because all aspects interrelate, building a solid foundation from which to work. The key factor in any evaluation is to find the basic underlying cause or causes so that symptoms are not being treated. This places the therapeutic approach on a solid foundation, which gives lasting results.

In applied kinesiology, the basic underlying cause is not always the initial factor treated. Applied kinesiology evaluation provides the ability to find areas of dysfunction and to determine how correction should be done. After the corrective approach is used, the same evaluation procedure can be repeated to determine if correction is actually obtained. If the correction is satisfactory, various methods can be used to determine whether it is permanent. If not, the factor which caused the dysfunction to return may very well be the basic underlying cause, rather than the initial factor treated. This procedure of evaluating, correcting, and re-evaluating should continue until the basic underlying cause is found and permanent correction obtained.

Another valuable aspect of the applied kinesiology examination is that it does not depend on symptoms related by the patient as guidelines for evaluation. Dysfunction can be found before a symptomatic pattern develops. This means the doctor can truly offer maintenance and prophylactic health care. This is in opposition to what is generally called "preventive health care" in the United States, which is really a periodic evaluation of the patient's blood and a physical examination to determine if disease has started. The ideal approach is to find the causative factors of disease before they have been present long enough to create actual pathology.

Naturally, the doctor using applied kinesiology should recognize the value of various other diagnostic tools, procedures, laboratories, etc., available to the healing arts, and use many of them. In cases where a patient requires certain procedures, appropriate referrals are made.

Presented here are examination procedures unique to applied kinesiology when used in combination with manual muscle testing. These have added significantly to the standard diagnostic procedures used by various disciplines in the healing arts. Body language is a broad term indicating what can be observed and tested for. Its evaluation is done throughout the physician's contact with the patient. Three applied kinesiology examination procedures are used early because they lead the examination, finding areas of involvement which would take considerable time if they were not available. These are — in addition to the usual palpation — postural analysis, temporal sphenoidal line, and meridian evaluation. They are the three basic diagnostic factors of AK because they evaluate the whole body rapidly. Because of the use of these indices for body function, many new developments have been made in AK. Though an involvement is indicated by one or all of these diagnostic factors, the actual involvement may not be found until deeper investigation is done by the examiner. Sometimes the persistence of the indicator leads to new observations simply because the examiner continues to dig until he finds the reason for it.

Body Language

The body has a language it presents to all who care to decode it. This language is being decoded by individuals like Goodheart who see with eyes that see, hear with ears that hear, feel with fingers that feel, and continually ask the question, "Why is that?" While lecturing, Goodheart often admonishes his class to observe and ask why. It is obvious that he follows his own admonitions because of the many innovative and effective approaches he develops in treating health problems and understanding body function.

The language of the body — and understanding it — can be likened to a page of Chinese script. Most of us in the western world would ignore it because we couldn't understand it. To someone who knows Chinese, it might be a most valuable document. As more information about body language is decoded, subtleties such as movements, structural distortions, colors, etc., have great value in determining why health is not at an optimum level. The doctor who learns applied kinesiology progressively asks more often, "Why is that?" rather than simply accepting that the unusual motion, response, or color is somewhat different in this patient.

In this short discussion of examination procedures, some of the methods of applied kinesiology's evaluation of body language will be discussed. However, body language is presented in detail throughout all five volumes of this series.

Body language consists of the body's reaction to different stimuli it receives, either through daily activity or from examination procedures. It may consist of postural balance or movement of an individual; it may be specific examination of areas, such as the temporal sphenoidal line or meridian pulse points, which are localized areas in which the body reveals considerable information about its function. Body language is something to be observed, decoded, and used.

All physicians use body language to some degree. Standard physical diagnosis discusses such factors as the patient's color, giving an indication of anemia, liver-gall bladder dysfunction, or flushing of blood to various areas. Structural balance is observed for gross distortions; however, subtleties — such as forearm rotation, shoulder level and head tilt — are largely ignored except by the tailor fitting a suit. The tailor is concerned only with getting the fabric to mold properly around the distorted frame. In fact, it is not considered unusual for people to have asymmetries since so many "normal" people have them. Variations in body build, hair characteristics, fingernails, and movements are all taken for granted as characteristic of heredity and individualism. Physicians of all types, including applied kinesiologists, have just begun to scratch the surface of what the body has to tell. Look, see, feel, and ask WHY.

YOU CANNOT RECOGNIZE
WHAT YOU DO NOT KNOW

Barriers to Reading Body Language

The physician wanting to increase his ability to read body language must make a conscious effort to see. He must recognize that several factors tend to override his observation ability. In an effort to broaden the ability to observe body language, let's consider some basic obstacles to effectively reading it.

1. Prior education may severely hamper one's ability to observe body language. Most physicians are taught during college that the cranium is a fixed structure; there is no movement in the skull. Study of the skull *in vivo* reveals apparent definite movement, and there is evidence of interference with a person's health if that movement is not proper. Indications of a cranial fault can be observed by asymmetry of the skull and facial muscles. These are difficult to observe until the significance is recognized.

2. One often fails to observe important body language factors simply because the factor is thought to be a normal variant within the population. We have already discussed structural variants which are of more concern to the tailor than to most doctors. To become aware of these structural changes, always remember that nothing takes place within the body without a reason. If there is muscular or other structural imbalance right to left, there is always a reason; it is not usually due to the handedness of the individual, or to congenital anomalies.

3. Ability to observe variants requires systematic study of subtle, frequently imperceptible, qualities. The author is reminded of the first time he observed Goodheart "reading body language." Here was an individual standing behind a patient he had never seen before, making observations about the patient's spinal structure, abnormal function, points of strain, and general health characteristics in more detail than most doctors could after a thorough examination. This knowledge about the patient was developed from visual observation only; it was found to be highly accurate after discussion with the patient and the actual examination. Many of the observations were made from a shadow caused by a slightly bulging muscle on one side, which was not apparent on the other side. The reason Goodheart was able to determine the patient's symptoms prior to discussion or examination was his highly developed ability to see muscular imbalance, and to tie that knowledge together with his knowledge of muscle-organ association.

4. To accurately read body language, it is necessary to have a working knowledge of the various energy patterns within the body. The meridian system can be very revealing for diagnostic purposes. When there is an energy imbalance within the meridian system, the body will reveal this information by thermal variances at different areas of the skin. Sometimes these thermal variances can be measured by accurately recording thermocouples, as used in biofeedback; other times the apparent temperature variance is subjective only. The patient may indicate coldness in a specific thermal area; on measuring the skin temperature, no variance is seen. Further evaluation shows the meridian represented by that thermal area is out of balance; even more extensive evaluation shows the organ and structures associated with that meridian to be deficient.

A patient may complain of a spontaneous pain at a specific body location, but usual procedures of evaluation show no reason for its presence. Those who are familiar

with the meridian system will recognize that the pain location is the alarm point of a specific meridian. This gives indication of system and muscular involvement, and which organs to evaluate. The evaluation logically proceeds into symptoms the patient may be experiencing which he failed to discuss with the doctor. Questioning along these lines can be fruitful, yielding additional information about the patient.

Skin conditions commonly follow the course of a meridian, again indicating the system and structures possibly involved. Patients will frequently complain of a swollen feeling in the foot, ankle, or hand. Upon inspection no edema is found. By having the patient specifically isolate the area that feels swollen, a meridian can often be identified as having an energy imbalance. Further evaluation reveals the actual cause of the patient's problem.

Many forms of referred pain are recognized in ordinary methods of diagnosis. Common among these are referred pain in the shoulder and arm with heart problems, pain at the level of the second thoracic vertebra with a gall bladder attack, and substernal pain (as well as left chest pain) with a hiatal hernia. Pain is referred into the meridian system in different forms of dysfunction also. Pain in the little finger may be noted by the patient, correlating with the heart meridian. There may be occasional pain in the great toe, correlating with the spleen meridian. These referred pains usually correlate with activity or stress to the patient's body; for example, walking up stairs may cause pain in the little finger with heart stress.

While body language by way of the meridian system gives indication of the patient's problem, it does not always mean the patient should be treated with meridian therapy. Some other form of treatment may be necessary to balance the energy system, such as any one of the five factors of the IVF. Treatment may also require nutritional supplementation, dietary change, structural correction, removal of mental stress, or any one of many factors. The key is to first understand what basic deviations from normal are taking place and then, by applied kinesiology examination, systematically determine why those aberrations are present.

5. Many observations of body language are gross; once we accept their significance, they are easily observed by anyone. Structural and thermal imbalance fit into this category, as well as body types, hair and nail characteristics, etc. On the other hand there is a broad form of hidden body language which some physicians can readily observe and others have to learn. There are some who never learn to see these hidden patterns. One form of hidden body language is the aura, seen only by those with higher sense perception. Individuals such as Karagulla[8] who have studied people with higher sense perception have shown us that many people have the ability to see these hidden patterns; however, general education in early childhood represses this ability to see something that others cannot see. It is necessary for the physician who wants to take full advantage of any potential he may have to completely free his mind and develop a positive attitude toward seeing hidden patterns in his patients.

One of the easiest of the hidden patterns to observe is the motion of the cranial-sacral-pelvic structures. Anyone can develop the ability to feel these structures move if he will invest the time to practice the skill. Remember the first time you were asked to palpate a sixth thoracic vertebra? All of the meat and bones in the back seemed like one general structure. With practice, it is easy not only to palpate the thoracic segment, but to sense the feeling of tension in muscles and movement of vertebrae. The same ability to feel motion in the cranial-sacral-pelvic area is available with effort, although at first this subtle movement is masked by the surrounding tissue and possible concurrent movement of muscles or joints.

Many doctors develop a "feel" for their patients. This sensation of knowing how the patient is doing, and possibly what is wrong with him, is something one doctor usually cannot describe to another; it is probably some higher sense perception characteristic. This capability develops to a higher degree as the doctor learns to relax and let the factors responsible really express themselves. Karagulla discusses many physicians who have outstanding reputations in diagnosis as having this ability. Whenever this type of body language is observed, the doctor should always follow through with objective testing procedures to put the information of higher sense perception into total perspective.

Challenge

Challenge is a valuable tool used in applied kinesiology evaluation. Originally it was a mechanism which presented the body with potentially adverse stimuli to determine if the body was capable of adaptation. In other words, challenge determined how the body reacted to stimuli. The term "challenge" has grown to include the body's reaction to both positive and negative stimuli. The effect of the stimuli is measured by manual muscle testing. The stimuli may affect a specific muscle associated with the challenge, or it may affect all muscles of the body. When a random muscle of the body is used to evaluate a challenge, it is called an "indicator" muscle. This evaluates the reaction of the entire body to the stimulus being tested. This comes from observation that with certain types of challenge, all muscles of the body have a temporarily reduced ability to resist a specific testing pressure.

Challenge — both positive and negative — can be used to evaluate all three sides of the triad of health. In fact, challenge is a very important factor in determining which side of the triad may be the basic underlying cause of a patient's health problem. By challenging different aspects of the various sides of the triad, it becomes obvious that there is an interplay between the sides. A challenge can be applied to one side of the triad, and significantly affect some aspect of another side.

A physical challenge to the body can be applied in many ways. It can be specific, such as a physical force being placed into an articulation to determine if the articu-

lation and its associated proprioceptors can accept the stimuli without adversely influencing body function. If there is a subluxation of the articulation, a physical challenge will cause an associated muscle (one influenced by the subluxation) to temporarily weaken or strengthen. The challenge can be placed into the articulation with specific vectors to find what vector causes a previously strong muscle to weaken, and what vector causes a previously weak associated muscle to strengthen, as observed by manual muscle testing.

The various vectors of force and evaluation of the body's reaction give specific information as to how the articulation is to be manipulated to correct its function. A general rule is that a spinal column structure is manipulated in the direction in which challenge causes a previously strong indicator muscle to weaken; an extremity articulation is to be adjusted in the direction that causes a weak associated muscle to strengthen. Further discussion of the challenge mechanism will be found in the vertebral subluxation and proprioceptors section of this volume.

After challenge has given information for manipulating the articulation, and that manipulation has been accomplished, it can be used again to determine if the correction was actually obtained. A normally functioning articulation will not show a positive challenge.

The chemical side of the triad is evaluated by challenge in many ways. It can be the administration of nutrition as a positive aspect, causing improved resistance of an involved muscle, or it can be the administration of detrimental chemicals, causing weakness of muscles. The administration of chemical challenge follows a specific protocol which is described later. Increased knowledge is rapidly being gained regarding the physiology behind the effects of chemical challenge.

The mental side of the triad of health can be immediately evaluated by challenge with positive and negative thoughts. A patient can be tested to determine the influence of a negative emotional experience. When the patient concentrates on the experience, an adverse effect on the body can be observed by the weakening of muscles. This is more obvious in specific muscles that equate with certain aspects of the autonomic nervous system, such as the stomach, adrenals, etc. Use of this type of challenge is very valuable in evaluating mental influence on the patient's health; it is discussed thoroughly in Volume V.

The challenge mechanism as evaluated by manual muscle testing is a strong asset to reading body language. The results of the challenge as observed by muscle testing parallel other methods of observing physiology. Biofeedback equipment methods show disturbance in the autonomic system. The Pulse Test of Coca[2] tests heart rate to evaluate allergens. When the pulse rate or autonomic balance changes, a change in strength can be observed on manual muscle testing. A parallel can also be seen on the mental side as it is evaluated by other physiologic parameters. The standard lie detector evaluates the immediate change in galvanic skin response, heart and breathing rates, etc., from emotional changes. Using manual muscle testing with the various forms of challenge simply provides a wider scope for immediately evaluating changes in physiologic activity that have been known for a long time.

Therapy Localization

When a patient touches an area which is not functioning correctly, there will be a change in muscle strength observed on manual muscle testing. This phenomenon was first observed by Goodheart,[5] and it has made a significant contribution to an improved understanding of body functions. Further research is necessary to totally understand this enigma.

Although a valuable tool, therapy localization is not an end in itself. It tells only where a problem is; it does not tell what the problem is, unless combined with other testing procedures. Therapy localization can be used to lead an examination, but it requires confirmation from other diagnostic criteria. Many factors are known about therapy localization, and several have hypothesized its mechanisms. It is possible that many of the hypotheses have value, because it appears that several factors are present in the phenomenon. This discussion will first include some of the ways therapy localization is used, and then some of the hypotheses that have been formulated.

Therapy localization can be used to determine the location of an involvement. When an involved area is touched by the patient, there will be muscle function change as observed by manual muscle testing. Either a strong indicator muscle will weaken, or a muscle which is weak because of the dysfunction will strengthen. For example, if a subluxation of the spine is touched, a muscle which is weak because of that subluxation will test strong on manual muscle testing, while a previously strong muscle (indicator muscle) will weaken. Either of these situations is known as positive therapy localization. After the subluxation has been corrected, touching the area will no longer cause a change of muscle strength as observed by manual muscle testing. The same basic effect is observed when an active reflex point, extremity subluxation, cranial fault, or active acupuncture point is touched. Basically, any therapeutic area will react as described.

Disease locations will also show positive therapy localization. For example, when a patient touches over an infected sinus, a previously strong indicator muscle will weaken. The involvement could be trauma, such as a fracture or a sprained ligament, which will also cause positive therapy localization. Nearly all pathologies or traumatized areas will therapy localize. Periodically an area known to have involvement will not show positive therapy localization. However, as more knowledge is gained, it has been found that there is positive therapy localization in many (and possibly all) of these areas which previously did not show it. The positive therapy localization is present, but it is subclinical and requires special methods to uncover the "hidden problem."

Therapy localization can be used to determine the length of treatment necessary on different therapeutic

points. For example, a patient may have a specific muscular weakness; therapy localization to a reflex point (any type) causes the muscle to strengthen. The reflex point is treated, and the previously weak muscle is re-tested and found strong. If re-therapy localization to the reflex point causes the muscle to again weaken, the point needs additional treatment. This is continued until therapy localization no longer causes the muscle to weaken, an indication that adequate treatment has been given.

Finding the basic underlying cause of a dysfunctioning area is the forte of therapy localization. For example, in the case of hypothyroidism, a previously strong indicator muscle will weaken when the patient touches a thyroid reflex area. The thyroid's interrelation with the rest of the endocrine system can be evaluated. The patient continues to therapy localize the thyroid reflex area with one hand, while sequentially using the other hand to therapy localize endocrine glands which may have an influence on the thyroid. If, when therapy localizing a gonad reflex area, the positive therapy localization of the thyroid is abolished, it indicts the gonads as inhibiting thyroid function. They have inhibition of the thyroid as a normal function, but it can be overdone. Further evaluation is then done for gonadal function, and therapy is directed toward the basic underlying cause of the hypothyroidism. Many new interrelations of the endocrine system have been observed by using therapy localization to evaluate the interactions of physiology in the body's own laboratory.

A structural example of using multiple therapy localization to find basic health problems is the patient who has a knee subluxation and consequent pain. If, after correction, the subluxation returns as soon as the patient walks, obviously some other underlying factor is involved. When the patient therapy localizes to the knee, there will be a weakening of a previously strong indicator muscle, giving evidence of the knee involvement. The same two-handed therapy localization described in the thyroid example above can be used to find the factor contributing to the knee involvement. The patient therapy localizes the knee with one hand and, using the other hand, therapy localizes first to the sacroiliac. A muscle is tested to see if the knee therapy localization is abolished. If so, the sacroiliac is indicted as being a contributory factor to the knee problem. If the positive knee therapy localization is not abolished, the ankle and foot should be evaluated. When the contributory factor is found, the positive knee therapy localization will be cancelled.

There are occasions when some therapeutic point needs treatment, but therapy localization will not show its involvement until combined with another means of diagnosis. For example, if a challenge to a structural area is positive, it is usual to test the reflex known as the neurolymphatic reflex to the same area to determine if there are lymphatic drainage problems. The neurolymphatic reflex may not show positive therapy localization, but if the challenge is repeated while the neurolymphatic reflex point is therapy localized, the challenge will no longer be positive. This indicates that the neurolymphatic reflex is involved with the problem, and it should be treated. This masking phenomenon is not well understood, and additional research is necessary to clarify its function.

Even though the exact mechanisms of therapy localization are unknown, it has become a valuable empirical tool in finding basic underlying causes of health problems. It has also been helpful in understanding the interrelations of the systems, organs, and glands of the body.

It must be remembered in using therapy localization that, unless combined with other procedures, it does not tell **what** a problem is, only **where** it is. A patient may show positive therapy localization to a vertebra. The structurally oriented doctor may immediately assume that there is a vertebral subluxation at that location. But it must be remembered that the posterior neurolymphatic reflex, the associated point in meridian therapy, and even the proprioceptors of muscles, which can show positive therapy localization, are located in this area. Evaluation must then be made for the possibility of pathology, such as osteoporosis, rheumatoid arthritis, etc. Since all these factors can show positive therapy localization, it is necessary for the doctor to make a differential diagnosis between the possibilities before jumping to conclusions for a therapeutic approach. It is worth restating: therapy localization only tells **where** something is involved, not **what** it is.

When muscle testing is being done and there is no desire for therapy localization, the patient's hands should be kept off his body. Hands placed randomly on the body could give accidental therapy localization and erroneous results. Before therapy localization was discovered, random therapy localization by the patient created a great deal of confusion for the examiner. It would appear that a muscle tested strong at one time; re-testing with no therapy administered would show a different result because the patient unknowingly allowed his hands to therapy localize a positive area.

Undoubtedly, therapy localization deals with numerous factors in physiology. Some of these are currently known and may tie in with some of the hypotheses presented here; others are yet to be discovered. When dealing with empirical testing using the body as a laboratory of investigation — as applied kinesiology does — we are dealing with clinical results for which the scientific community may not yet understand the mechanisms. By investigating these consistent findings and developing a hypothesis, a foundation for laboratory research is established.

The electromagnetic energy pattern of the body has been considered by many to be a significant factor in therapy localization. This possibility has not been thoroughly investigated and presented in written form at this time. However, considerable material can be found regarding aura, electromagnetic effects on the body, etc. Karagulla[8] has studied and provided evidence of auras and vortices of force as seen by people with purported higher sense perception. Kirlian photography,[9, 11] properly accomplished, records the electromagnetic field which seems to show a difference in health and disease. Davis and Rawls[3] have studied electromagnetic effects on the body and, along with others, have listed some of the areas of the body considered to be positive and negative.

Several factors seem to indicate there is an electro-

magnetic character to therapy localization. In certain situations, an area showing positive therapy localization will do so only with the palmar or dorsal surface of the hand. The hand has different polarities on the two sides; if the body is not functioning in an organized manner, there may be a lack of therapy localization from one side of the hand. When the body is functioning in a balanced manner, therapy localization can be accomplished with either side of the hand. It can even be done by touching an area with the foot, or with the tongue to points within the mouth. Tongue activity may relate to meridians located within the mouth.

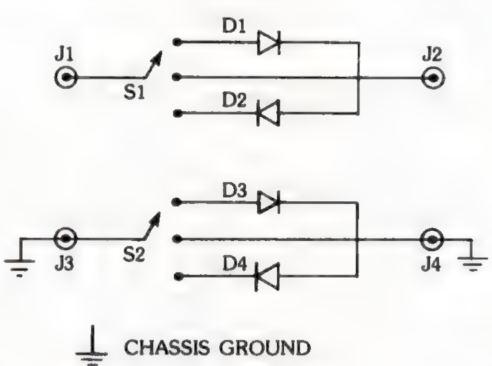
The electronic factor of therapy localization appears to be supported by the observation that therapy localization is changed when conductivity is changed. Reduction can be the result of the patient being dehydrated, and can be improved by ingesting water or dipping the fingertips in water prior to therapy localization. Body lotions and cosmetics will sometimes interfere with therapy localization. A confusing aspect of this is that therapy localization can be accomplished through natural fabrics such as cotton, wool, etc., fairly efficiently. It is more difficult to therapy localize through synthetic fabrics such as nylon, acetates, etc.

Further evidence that the energy of therapy localization is electrical is that it will pass through an electric wire. A wire for therapy localization can be made by attaching a hand-held electrode to one end of the wire to gain contact from the hand to the wire; on the other end attach an electrode such as a precordial electrocardiographic lead that can be attached to the skin with suction or other means. The ECG lead can be attached to an area where therapy localization is desired. There will be no change in the strength of the indicator muscle until the hand electrode is contacted by the patient's hand. When the circuit is complete, the same effects of therapy localization will take place as if the patient were actually contacting the point being therapy localized.

In the electromagnetic consideration, it appears that therapy localization is either adding energy to, or taking it from, an involved area. A circuit can be constructed that allows electrical flow in only one direction by simply using a diode or a transistor. A switch can be added that reverses the effect of the diode or transistor, allowing energy to flow in either direction, depending on the position of the switch. A center position allows current to flow in both directions. When this type of circuit is placed in the electrical wire previously described for therapy localization, the direction of energy flow can be observed. Under some conditions there will be positive therapy localization when energy flows to the point of therapy localization. Under other conditions, there will be positive therapy localization when energy flows away from the point.

An example of this occurs when an active reflex causes a specific muscle to weaken. Therapy localization to the reflex point will cause the muscle to gain strength. After treating the reflex, the muscle will be strong in the clear; however, it may weaken again when the reflex is re-therapy localized. This indicates that the reflex needs further treatment. This has been described before, but now let's put the evaluation of therapy localization directional flow into the picture. When the reflex is therapy localized and it strengthens the muscle, it is because energy is being added to the reflex; thus the direction of energy flow is from the hand to the reflex. After the reflex has been treated (but not adequately), the muscle is strong in the clear but weakens when the reflex is re-therapy localized. In this case, energy is flowing from the reflex point to the hand, away from the reflex. After the reflex has been adequately treated, therapy localization will not affect the muscle in any way. Experiments have been done in our laboratory with this type of electrical circuit to evaluate therapy localization. Evaluation has been done with both unshielded wires and circuit, and shielded and grounded wires and circuit. There appears to be no difference in the outcome of the therapy localization, whether shielded or unshielded.

It has been mentioned above that the therapy localization energy will travel through clothing or other substances. There are substances it will travel through, and those which block it. In general, electrical conductivity of the material is not a factor as to whether therapy localization energy can be transmitted. Substances such as wood, cloth, and paper transmit therapy localization energy; it is poorly conducted or blocked by substances such as lead, plastics, and ceramics. Very strong therapy localization



3—1. Schematic of circuit to limit current flow to one direction. Two circuits are shown, one shielded and grounded. It does not appear to make any difference which is used.

3—2. Electrodes, wire and circuit being used to therapy localize along thoracic spine.

can be transmitted through thin sheets of material that typically block it; very weak therapy localization will be blocked by material that ordinarily transmits the energy.

There are several methods to increase the power of therapy localization. In some instances, it is necessary to wet the patient's fingertips, apparently for better conductivity. For the same reason, body lotions or cosmetics may need to be removed with either a dry cloth or possibly with a solvent such as alcohol.

Placing the hands one on top of the other also gives a more powerful therapy localization. This may be necessary, either palms up or palms down, to obtain positive therapy localization in an area that it appears should be positive but does not test so.

Goodheart[6] evaluated various forms of testing when the patient held his thumb and little finger in opposition, as suggested by Coblentz.[1] It was observed that when the patient therapy localized with the three remaining fingers, holding the thumb and little finger in opposition, therapy localization sensitivity would be increased. This became known as the "Boy Scout salute" or high-gain technique of therapy localization. Goodheart hypothesized that this method of therapy localization increased sensitivity because the thumb and little finger opposition in man is correlated by some anthropologists as being connected with, and developed in direct parallel with, the evolution of the human cerebral cortex. Some use this high-gain technique of therapy localization as a routine approach; others routinely therapy localize either palm up or palm down, and use the double-handed therapy localization and high-gain technique when additional therapy localization sensitivity is desired.

When therapy localization to an area is positive, it may cease to be positive if the patient contacts the point for a prolonged period of time. The activity does not seem to have any therapeutic value, as the positive TL returns after a short time. If the physician is distracted, e.g., looking at a chart, it is best to discontinue the TL until ready to perform the test.

3—3. The use of high-gain therapy localization over sacroiliac.

Although there is significant evidence that therapy localization is correlated with electromagnetic energy, there is also a suggestion that it is neurologic in nature. Goodheart[7] hypothesized that the activity of therapy localization correlates with a spinal gating mechanism similar to the Melzack and Wall[10] gate control theory of pain perception.

Postural Analysis

Equal pull by antagonist muscles is a key to structural balance. This fact has been observed by physicians of all kinds for centuries. In the past, there were two primary methods by which muscular imbalance was treated. Most attention was directed to the hypertonic muscle, usually because it was the one exhibiting pain. Ultrasound, diathermy, infra-red, hot packs, injections, muscle relaxants, etc., were often used with very few beneficial results that were permanent in nature.

On the other hand, much emphasis has been placed on exercising weak groups of muscles, often accomplishing little. The usual sit-up exercise prescribed for weak abdominals may not make much change regardless of the patient's efforts if some abnormal factor is causing inhibition of the muscles. It is not uncommon in an applied kinesiology practice to have a new patient come in with weak quadriceps, abdominals, etc.; muscle testing rapidly confirms the problem. When the patient is told of the weakness, already obvious from the testing procedures, he remarks, "But I've been exercising that for the last six months! Why doesn't it strengthen?"

Indeed, why doesn't the muscle strengthen from vigorous exercise? And why doesn't the hypertonic muscle relax from a significant amount of physiotherapy? The ability to change muscle function immediately with various AK techniques has provided insight, giving some answers to these questions. If one of the five factors of applied kinesiology treatment is involved in a specific muscle malfunction, exercise will probably produce relatively poor results until that factor is corrected. For example, a sagittal suture cranial fault is associated with weak abdominals. If that is the cause of the abdominal weakness, exercise will be of little value until the cranial fault has been corrected. An athlete may have exceptionally weak quadriceps in spite of the six months he spent exercising by lifting a boot. Thirty seconds of applied kinesiology treatment can return the quadriceps to phenomenal strength, and it will remain strong unless the athlete is injured again. If that is the case, re-evaluation and treatment of the cause will immediately return the leg to normal function.

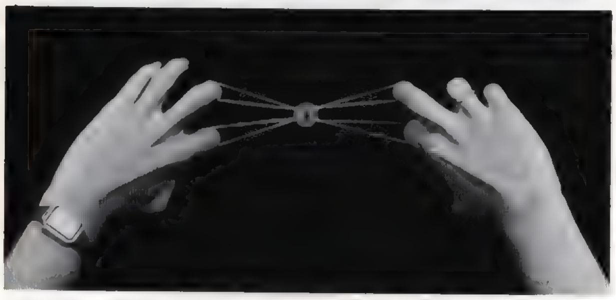
The hypertonic muscle is usually not the primary involvement. This is why repeated physiotherapy to the hypertonicity does not permanently correct "muscular tension." A muscle will contract when it has no opposition. The "balling up" of the biceps brachii when its tendon is torn loose is an example of this activity. Of course, the

shortening of the biceps brachii is maximum in this instance, whereas when a muscle contracts because of inadequate strength of an antagonist, the contraction is of much lower intensity. The intensity depends on the amount of antagonist weakness. There is an interesting aspect to treating with physiotherapy a muscle which is hypertonic secondary to weakness. If the treatment is successful, the patient will then have two weak muscles. Treating the primary weakness, which allows contraction of an antagonist muscle, immediately returns the weak muscle to normal; the hypertonic antagonist will usually return to normal without any additional therapy.

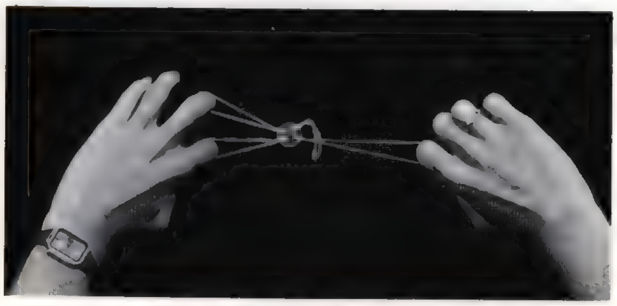
To evaluate this type of imbalance, use digital pressure in the belly of the hypertonic muscle, noting the amount of tenderness. After effectively correcting the primary weakness, tenderness in the hypertonic muscle will be significantly reduced or removed altogether.

When muscle imbalance is present, the structure being held in place deviates from normal and cannot be returned to permanent balance until the muscle imbalance is corrected. In other words, a structure can be manipulated into balance, but if the muscular imbalance is not corrected, the structure held by the muscles will not remain balanced.

A good way to explain this to patients is to use a button with four rubber bands attached. In each hand hold the ends of two rubber bands, suspending the button in the center. Explain: "The rubber bands represent your muscles pulling on the button, which is your vertebra. The button stays in the center because the pull on it is equal from both sides." At this point drop one of the rubber



3—4. Structural balance is present when pull from both sides is equal.



3—5. An imbalance of pull causes the structure to deviate to the stronger side.

bands, making the pull stronger from one side. Continue: "This represents the condition that results from your weak muscle. The vertebra is pulled out of place, and no matter how many times we center it with manipulation, it won't stay until we correct the muscle imbalance." If you are working with a patient who thinks in a kinetic sense, it is of value to have him put the button in the center, let go, and allow the button to be pulled out of balance again. This description is especially good for the patient who has been to another doctor using manipulation, who has found it necessary to repeatedly manipulate an area for years. The patient has usually been told by the other doctor that he has an unstable sacroiliac, vertebra, etc., and it simply needs to be corrected periodically. These patients will frequently be referred to you because of your reputation for obtaining lasting corrections. This same muscular imbalance discussion can be used for the knee, foot, or any other structure.

Evaluation of postural distortions and their correlation with body dysfunction is classic in applied kinesiology. Structural distortions due to muscular imbalance become much more important because of the association between muscles and organs or glands. This makes postural analysis a key part of the body language which helps the examiner find basic underlying causes of health problems.

Evaluation

When first beginning to evaluate structural deviations, it is best to consider one major muscle at a time. When an apparently weak muscle is found, test it for confirmation. If there is no weakness correlating with the postural distortion, look for the antagonist, synergist, or other muscle involved causing the postural distortion. Soon the interplay between muscles becomes apparent.

Failure to find a weak muscle with the postural imbalance may be a result of the body's compensatory mechanisms attempting to regain normal structural balance. Structural imbalance may be present indicating a certain muscle should be weak; however, when tested, it is not. Further evaluation can indicate any one of many reasons for the structural imbalance. The muscle may be involved with an improper energy or nerve pattern; however, because of the body's effort to use compensatory mechanisms, substitute control or energy is supplied and the muscle tests normal. This can be revealed by challenge to the different energy patterns of that muscle. Vertebral challenge and therapy localization to the various reflex and meridian points are among the methods which reveal subclinical weakness.

When a postural pattern indicates a specific muscular weakness and the muscle tested does not reveal it, the problem may be remote from the apparent imbalance. Do not neglect looking for the problem on the opposite side. For example, an individual may have a high shoulder on the left (3—6). The latissimus dorsi responsible for holding the shoulder down is found to be strong, and there is no evidence of subclinical weakness with therapy localization and challenge. Further evaluation shows a head tilt to the left, with slight right head rotation. Testing the upper trapezius on the right reveals a weakness; thus the reason for the high shoulder on the left is now seen. The weak upper trapezius allows a shoulder drop on the right and a left head tilt, causing an apparent high shoulder on the left because of the contraction of the left upper trapezius,

3—6. Note high shoulder and head tilt toward left side. The clue that this imbalance is from an upper trapezius weakness on the right is the head tilt away from the low shoulder side. In this instance, the latissimus dorsi tested strong on both sides.

unopposed by the weak right upper trapezius. The slight right head rotation may or may not be present, depending on the relative balance between the neck flexors, especially the sternocleidomastoid.

With practice, reading body language in postural distortions becomes second nature. Expertise is gained by searching out the reason for postural distortion when the major muscle usually associated with that distortion is not weak. There is great interplay and complexity in body distortions. There is always a pattern which will reveal the true energy imbalance in an individual when searched out thoroughly.

As the major distortions are learned, the subtleties of structural evaluation become second nature. Much information can be gained by observing a slight depression on the body's surface because of a weak muscle underneath. The hypertonic muscle will frequently cause a slight bulge, often revealed by a shadow. When first learning to see these subtle imbalances, it is best to evaluate the body bilaterally, looking for a depression or bulge on one side which is not present on the other. When subtle variations from side to side are easily recognized, it is time to start looking for bilateral weakness or hypertonicity. Bilateral involvements are more difficult to observe because there is nothing for comparison. A bilateral lower trapezius weakness may be observed by the scapulae being elevated bilaterally. There will usually be a characteristic rolling forward of the shoulders in this situation. A slight hollowness in the supraspinatus fossa of both scapulae may indicate a bilateral supraspinatus muscle weakness.

The patient's structural balance should be evaluated in all positions in which the examiner has opportunity for observation. The prone position may reveal an imbalance of the sacrospinalis, one side looking ropy and standing high, and the opposite side atonic. The gluteus maximus may stand round and firm bilaterally, or there may be a sagging, hanging mass on one or both sides. When the patient is supine, a quick observation of whether the legs are neutral, medially or externally rotated gives evaluation of the piriformis, psoas, and other leg rotator muscles. The sitting patient may have a completely different balance of the shoulders and head from that when standing, indicting the feet or pelvis as having an abnormal influence on structural balance. When there is a change of postural balance from position to position, the examiner should ask himself what structures are used in one position and not in another. For example, the feet and leg muscles are taken out of the equation when the patient adopts a sitting position.

Dynamic Evaluation

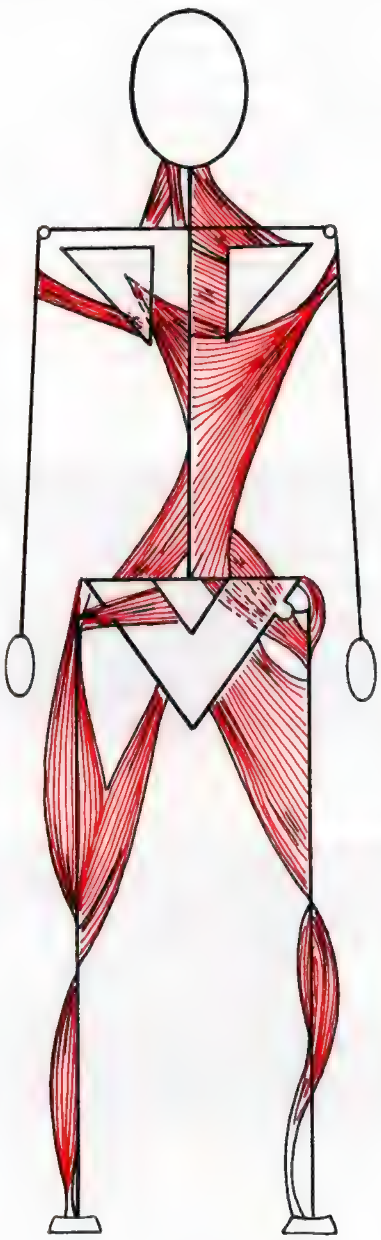
Structural imbalance has classically been taught as a static evaluation, usually correlated with a plumb line. This is an excellent starting point in the learning experience; however, much better information can ultimately be gained by evaluating the patient in motion. Doctors have a tendency to do examinations with the patient positioned for their convenience. This is not the way the patient lives. He is a moving, sitting, lying, walking, running structure. Structural evaluation should be continued through all motions the patient makes during his visit to the office. Observe for good quadriceps function as the patient gets up from a chair. Does he have to lean to one side to use the quadriceps of that side? Does he hesitate when rising from a chair, shifting his body to give synergist muscles added ability? As the patient arises from the supine position, does he have to roll to the side because of weak abdominals, psoas, or rectus femoris? As he goes back into a supine position, does he have to protect his neck because of weak anterior neck flexors? The way people move is indicative of their structural balance.

Continuing the thought of examining the patient in the manner in which he lives rather than for the doctor's convenience, consider having the patient run or walk prior to examination. Evaluate his gait, noting whether one arm or leg is thrown out more when moving. Is the rotation of the trunk uniform bilaterally? Is pelvic rotation and elevation bilaterally uniform? Actions such as bending, flexing and turning while walking are sometimes important in revealing structural imbalance in an individual.

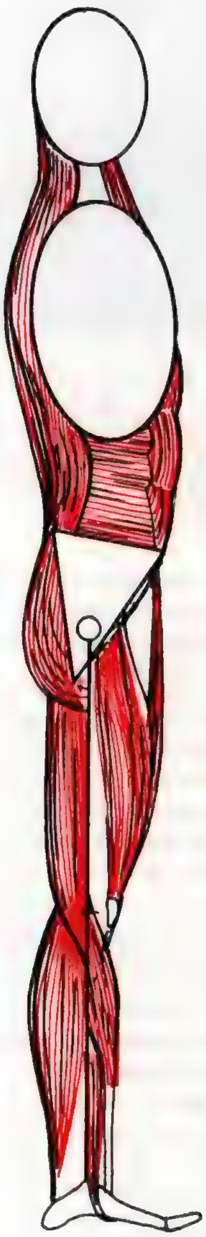
Postural analysis is one of the three major diagnostic criteria which leads the doctor to basic underlying causes of health problems in applied kinesiology. Postural analysis has its greatest value because of the association between muscles, organs, and glands. Although it is important to listen to symptoms the patient verbalizes, it is possibly more important to evaluate factors about body function

which seem unrelated to symptoms. Many times the symptoms about which the patient complains are secondary in nature; therapeutic efforts toward the symptom complex simply "whitewash" the old battleship, making it look good for a while, but the problem will recur, with the same or different symptoms.

Postural analysis evaluation should begin when the doctor first meets the new patient. During consultation, important information can be gained by simply watching the patient move, the position he uses while sitting, his effort in getting up from a chair, etc. The experienced applied kinesiologist develops many of the questions he will ask during consultation and examination from observation of the patient's postural and movement patterns. This observation becomes second nature. It is not unusual for the spouse of an applied kinesiologist to become somewhat irritated listening to comments such as, "That person probably has a blood sugar handling problem; over there is a knee and elbow problem; if that person doesn't have headaches now, he will soon" — all this while walking down the street or sitting in a restaurant. Interestingly, as the spouse becomes more familiar with body language, he or she begins commenting about the possible ailments of strangers met in daily activities.



3—7.



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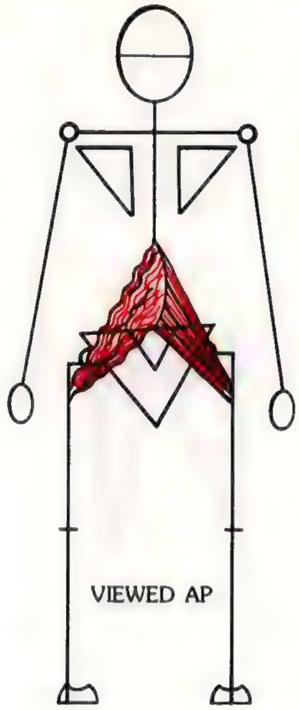
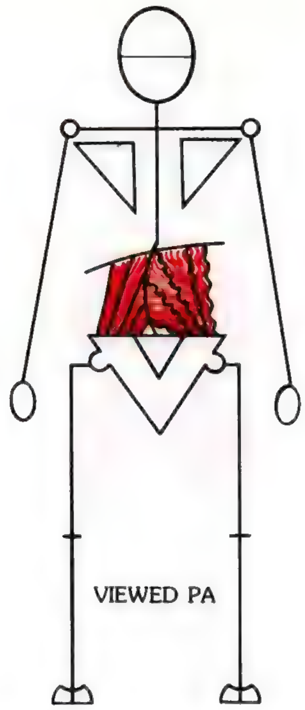
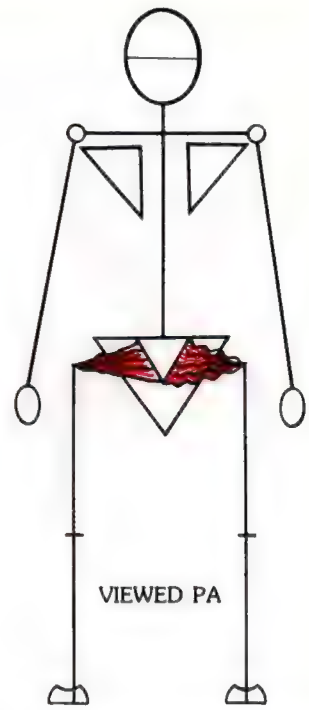


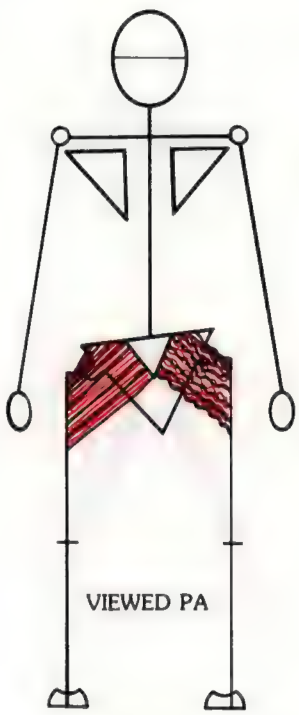
3—9. Toe turn-in on weak psoas side. Pronation of foot tendency. Pelvis raises and lumbars deviate to tight psoas side.



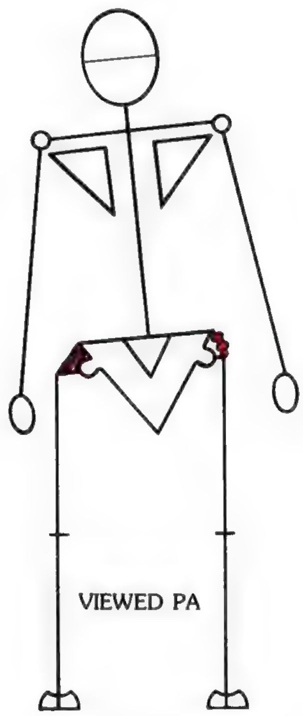
3—10. Right quadratus lumborum weak. Pelvis level, right 12th rib elevated and left lumbar curved.



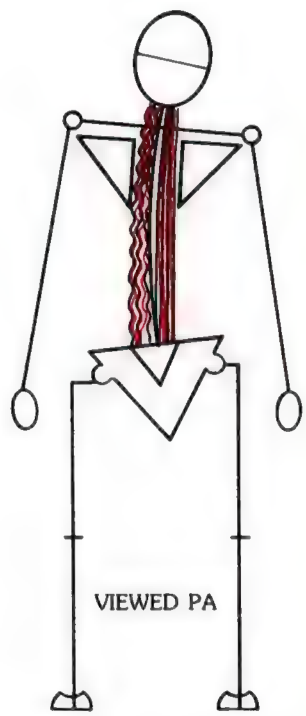
3—11. Right piriformis weak, left over-contracted. Left foot turns out.



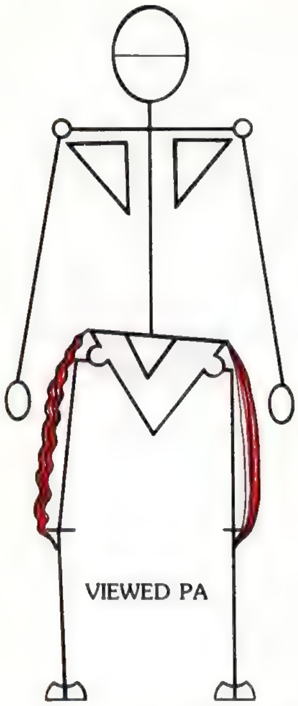
3—12. Pelvis elevation on side of gluteus maximus weakness. Leg and foot medial rotation; some loss of lateral knee stability.



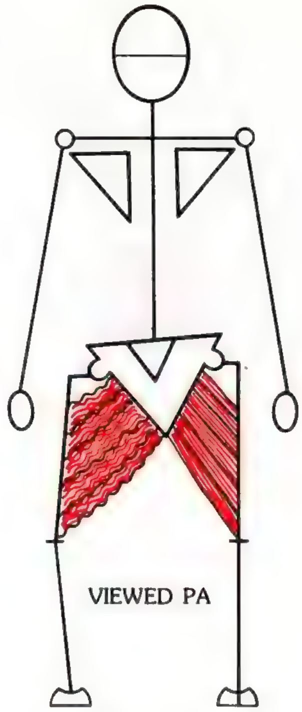
3—13. Right gluteus medius weak. Right pelvis, shoulder, and head all elevated.



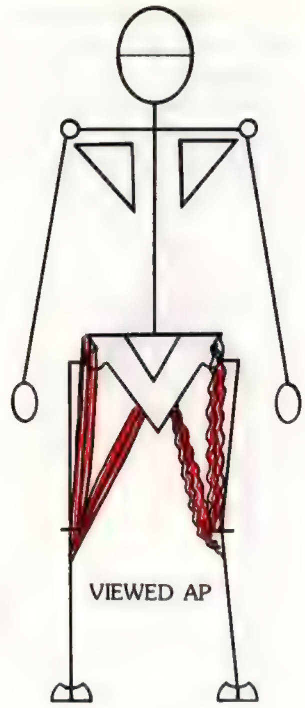
3—14. C-curvature on side of weak sacrospinalis. Shoulder, head elevation and low hip on side of weakness. In prone position, weak sacrospinalis is atonic.



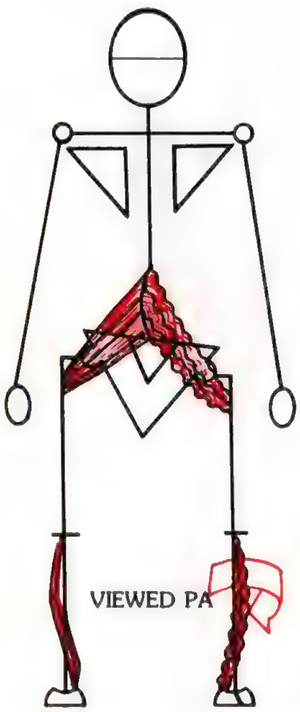
3—15. Left tensor fascia lata weak. Genu varus and pelvic elevation on weak side. Gluteus maximus also aids this knee support.



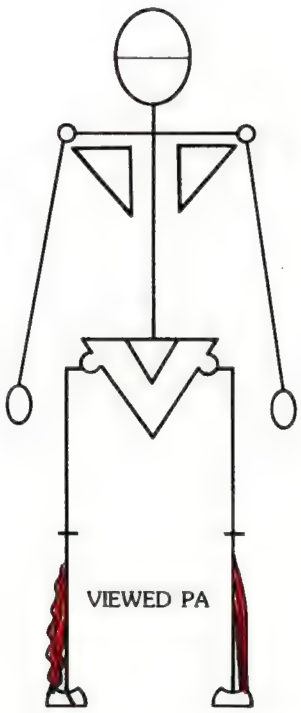
3—16. Left adductors weak. Genu varus on weak side. Pelvis elevation on opposite side.



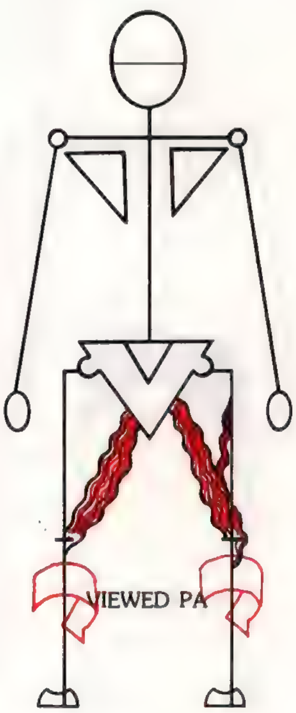
3—17. Weak sartorius and/or gracilis. Genu valgus — also affects A-P balance of pelvis.



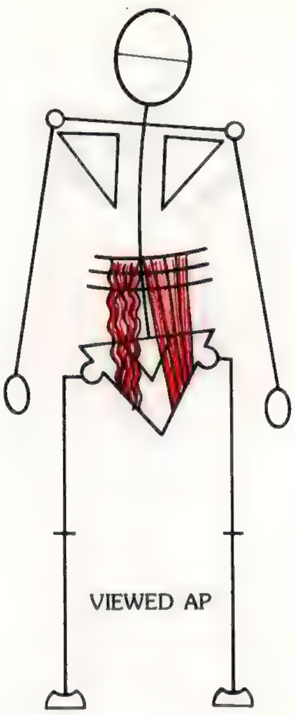
3—18. Anterior tibial weak on right. Ankle pronation or pes planus. Problem compounded if psoas allows medial leg rotation.



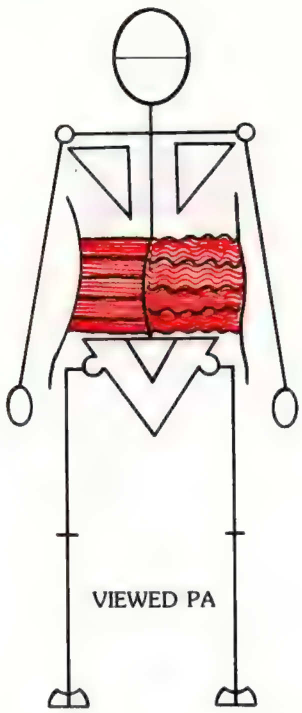
3—19. Weak peroneus group on left allows pes cavus or supination.



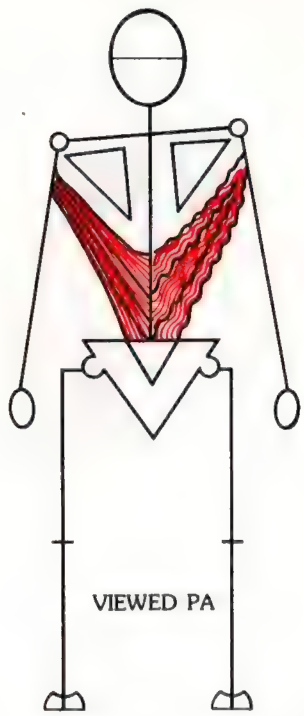
3—20. Medial hamstrings weak allow external foot rotation. Lateral hamstring (biceps femoris) allows medial foot rotation.



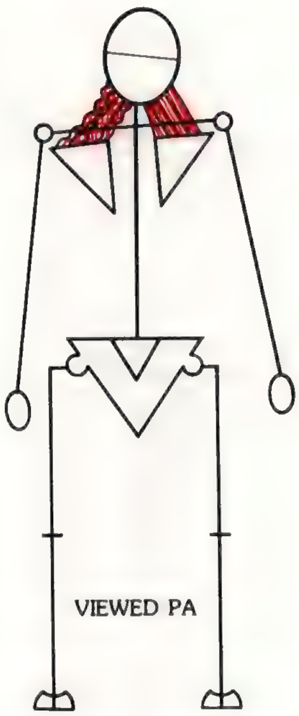
3—21. Weak rectus abdominis allows separation of pelvis and thoracic cage. If bilateral, a lumbar lordosis develops.



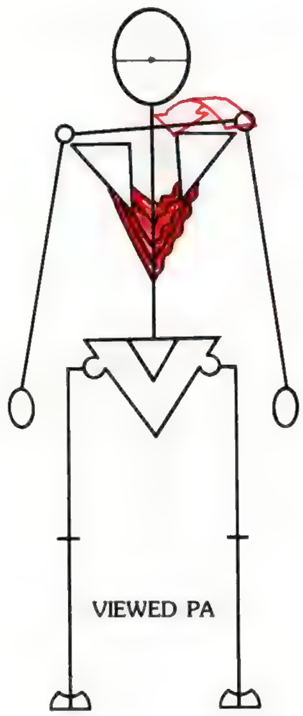
3—22. Weak right transverse abdomen. Lateral abdominal bulge and possible scoliosis. Abdominal bulge is best seen with patient doing a sit-up.



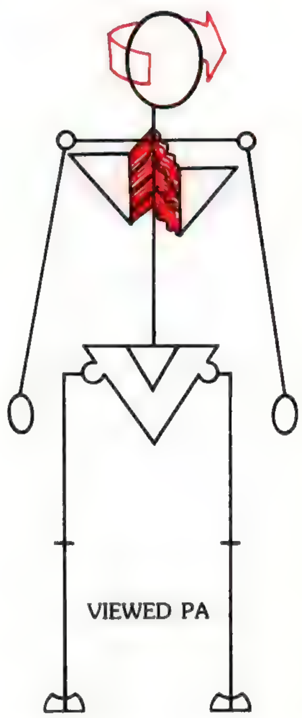
3—23. Weak latissimus dorsi on right. High shoulder and head level if other muscles are not involved. Upper trapezius involvement can easily confuse the pattern.



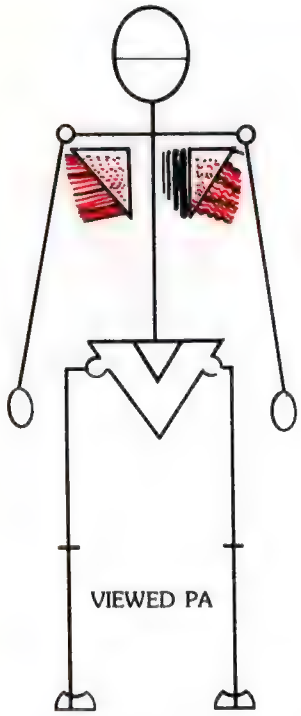
3—24. Weak left upper trapezius. Shoulder low on side of weakness. Head tilt away from side of weakness. Usually secondary tightness on opposite side.



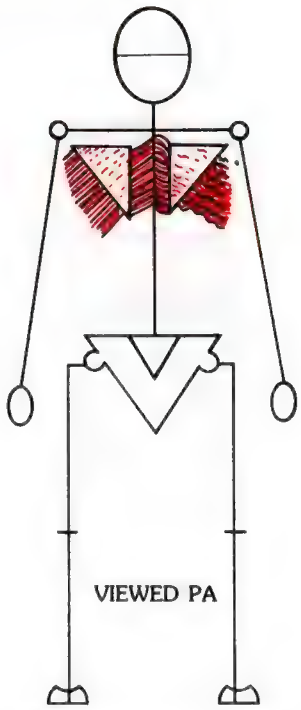
3—25. Weak right lower trapezius. Elevated scapula, kyphotic dorsal spine and forward roll of shoulder.



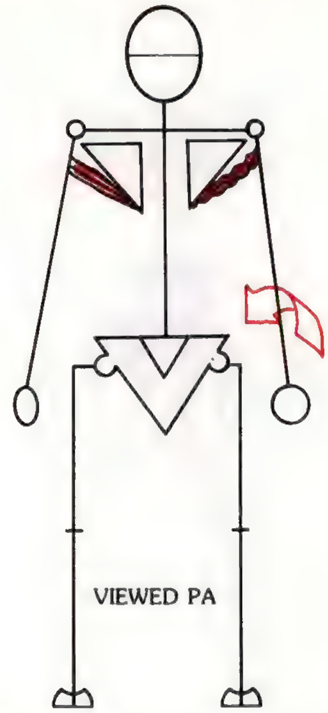
3—26. Weak rhomboids on right allow scapula to sag and head to rotate toward side of weakness.



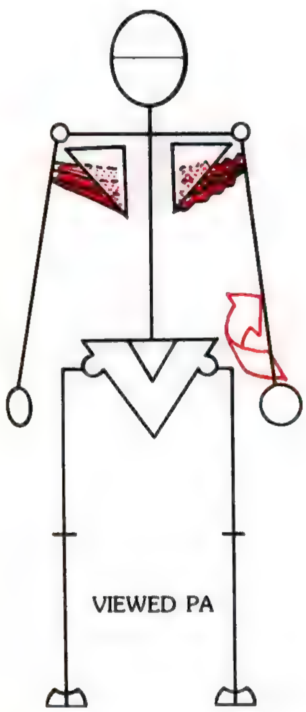
3—27. Weak serratus anticus on right allows scapula to wing away from thoracic cage.



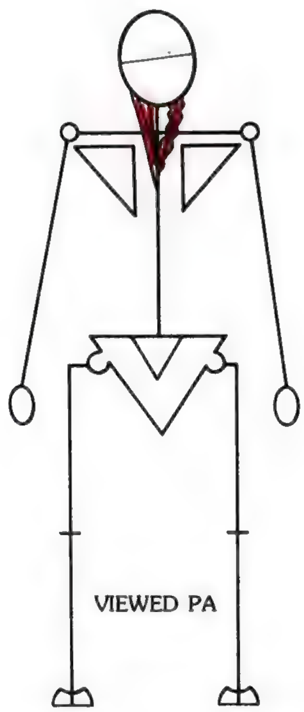
3—28. Weak serratus anticus with secondary rhomboid contraction. Less winging of scapula because rhomboids hold it in as they elevate the scapula.



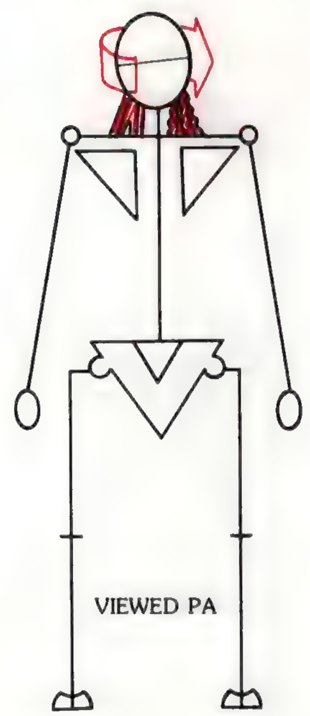
3—29. Weak right teres minor and/or infraspinatus with other lateral rotators (posterior deltoid, supraspinatus) allow internal rotation with hand facing palm posterior.



3—30. Subscapularis and other medial rotators (teres major, anterior deltoid, pectoralis major, latissimus dorsi) when weak allow lateral rotation or the palm to face forward.



3—31. Neck extensor and/or scalene group.



3—32. Sternocleidomastoid weak on right. If tilt is due to SCM only, head rotation will be to side of weak SCM.

3—33. Weak abdominals fail to keep pubes and anterior thorax approximated. Lordosis of lumbar spine and facet jam result.

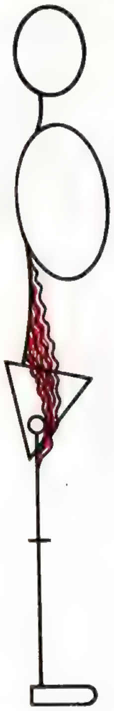
3—34. Hamstring if weak allows anterior tilt of pelvis, lumbar lordosis, and facet jam. Correlate with possible posterior ischium subluxation.

3—35. Gluteus maximus provides posterior pelvic, lateral knee support. Weakness contributes to lumbar lordosis and facet jam, plus knee instability.

3—36. Weak sartorius and/or gracilis fails to support anterior pelvis. Posterior pelvic imbalance results. Correlate with possible posterior ilium subluxation.

3—37. Rectus femoris weakness allows posteriority of pelvis.

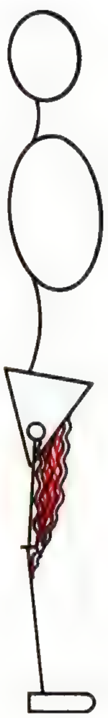
3—38. Forward lean is present in soleus weakness due to poor posterior tibial support.



3—39. Bilateral psoas weakness allows loss of lumbar curve.

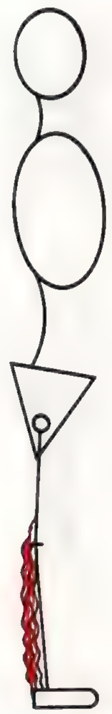
3—40. Weak lower trapezius fails to support thoracic spine, and kyphosis results.

3—41. Forward head position from weak cervical extensors.



3—42. Lack of anterior support of knee by weak quadriceps causes knee hyperextension.

3—43. Knees hyperextend when popliteus is weak.



3—44. Hyperextension of knee is compensatory for weak gastrocnemius.

3—45. *Weakness of triceps brachii causes elbow to be in excessive flexion. Evaluation must consider possibility of overdevelopment of biceps brachii. Illustration exaggerated.*

3—46. *Weak biceps brachii causes elbow to be straight or in extension. Illustration exaggerated.*

Temporal Sphenoidal Line

The temporal sphenoidal line (TS line) is one of the three basic diagnostic factors in applied kinesiology. It is a line present on both sides of the cranium, along which there are diagnostic points that become nodules when specific organs and muscles are dysfunctioning. In applied kinesiology's early days, the TS line was relatively difficult to use; it would indicate an involvement, but upon testing, nothing would be found. As AK knowledge has increased, it is rare that a TS line indicator is present and the condition associated with it cannot be uncovered. As more reasons for positive TS line indication are found, its reliability as an indicator is being re-confirmed.

It is absolutely necessary for an applied kinesiologist to master the TS line if he is to gain the optimum value from AK. Unfortunately, many who use applied kinesiology have made cursory attempts to use the TS line and have then given up. Mastering it requires persistence; once accomplished, it is difficult to remember why it was such a problem in the beginning.

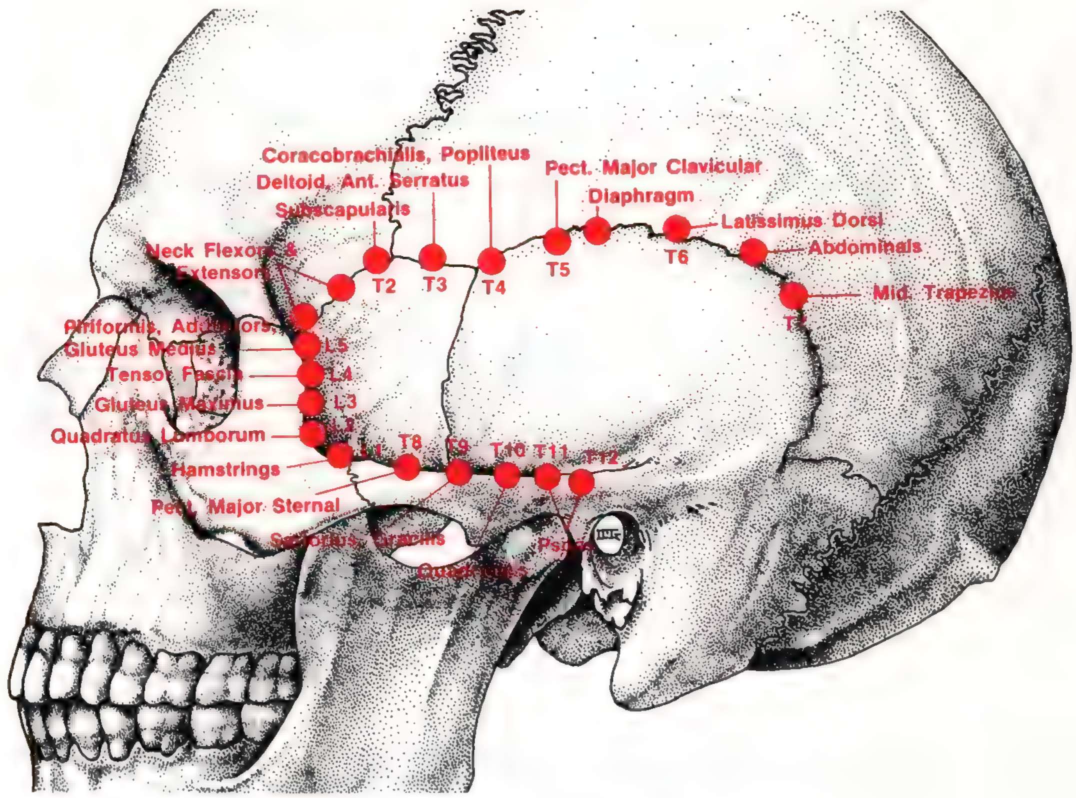
The TS line was discovered by Major B. DeJarnette, D.C., and developed by M. L. Rees, D.C., of Sedan, Kansas. It was originally correlated to organs; Goodheart[4] found a correlation of the organs represented on the TS line with the muscle-organ/gland association previously developed in applied kinesiology. The TS line used in AK varies slightly from that used in sacro occipital technique.

The physiology for the presence of TS line indicators is unknown. Some hypothesize that activity along the TS line is a result of cranial respiratory function, while others believe its presence correlates with embryologic unfolding. The latter is supported by the homuncular location of the points. In other words, the order in which TS line points appear is the same as sections of the spine.

Location

The line begins just anterior to the external acoustic meatus, and just superior to the anterior portion of the articulation of the mandible to the temporal bone. It progresses anterior along the superior surface of the zygomatic process of the temporal bone. After traversing the zygomaticotemporal suture, the TS line turns superior and courses along the edge of the temporal border of the zygomatic bone. Upon reaching the level of the frontal bone, it continues along the superior edge of the great wing of the sphenoid and along the temporoparietal suture to approximately one inch behind the external auditory meatus. The diagnostic points are distributed along this line, and are approximately 1/4" apart along the lower horizontal line and the vertical line. The upper horizontal line has points from 5/16" to 3/8" apart (3—47, 3—48).

The vertebral correlation with TS line points indicates a possible subluxation in the vicinity of the listed vertebra. It does not mean that there will definitely be a subluxation in that area. Along the lower horizontal line, the 8th-12th thoracic vertebrae are represented. Along the vertical line are the 1st-5th lumbars, while along the upper horizontal



3—47. Temporal Sphenoidal Line

line are the 2nd-7th thoracic vertebrae.

Technique of Use

An active point on the TS line is a nodular, tender area which shows positive therapy localization. Active TS line points are diagnostic only and have not been found to have value for therapeutic purposes in applied kinesiology. An active TS line point feels somewhat like a BB under one or two slices of bacon. When first learning to use the TS line, confirm points located by palpation with tenderness on digital pressure, and by positive therapy localization. Tenderness along the TS line does not necessarily mean that there is an active point at that area. Many times when cranial faults are present, the sutures where the TS line is located will be tender, but will not actually have active points.

Palpating the TS line is easily done by starting anterior to the ear and palpating around the full length of the line. Palpation is done with a very light touch. It helps to use a somewhat rotatory motion, sliding the integument over the TS line for the examiner's improved sensory ability.

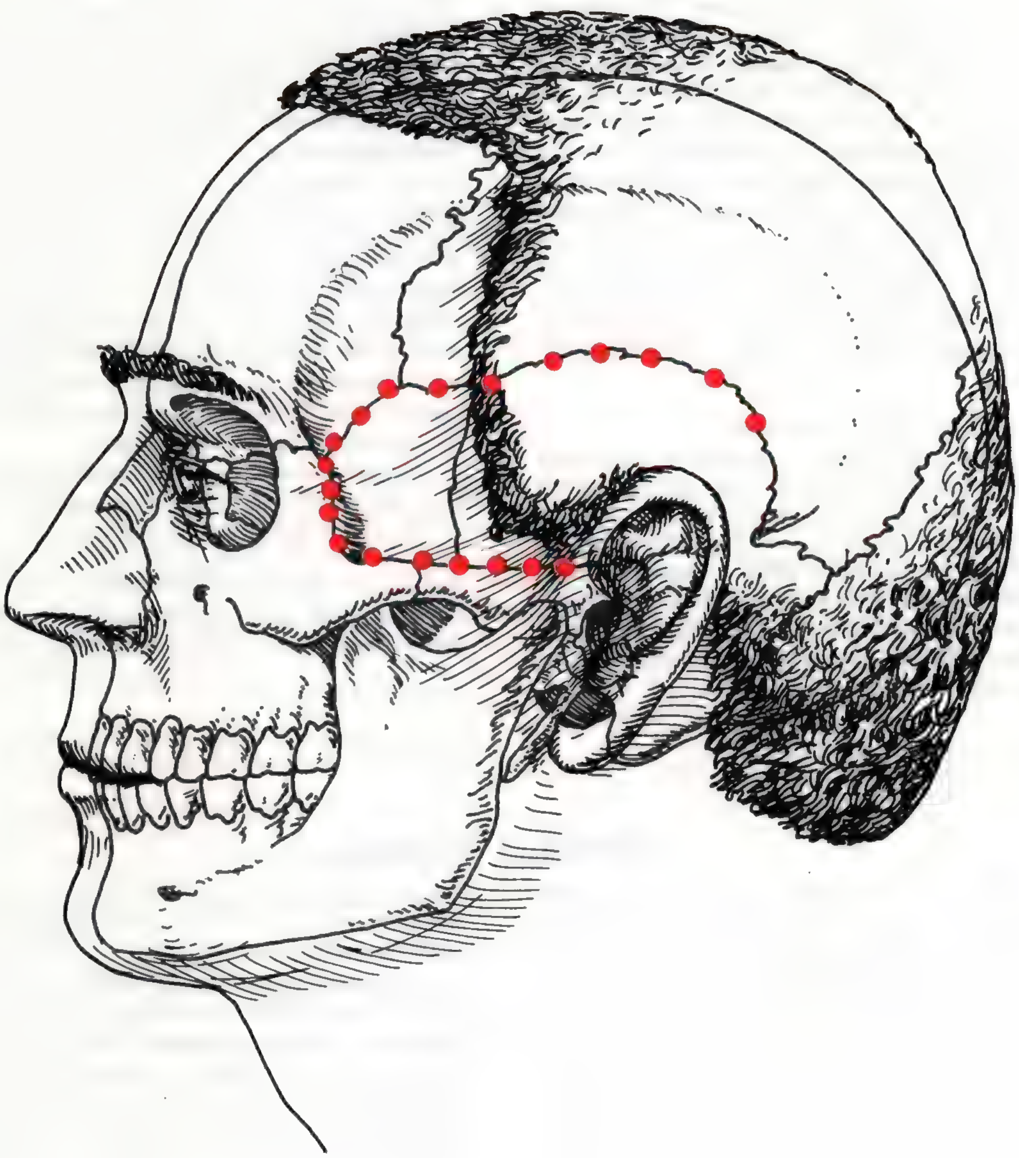
Positive nodules along the TS line are most easily felt on older individuals. In fact, on many older, thin people with little hair, the TS line can actually be seen. These are good individuals on whom to practice using it. On the younger and obese individuals, the TS line is much more difficult to palpate and requires considerable experience.

Therapy localization to a TS line nodule is hampered when the patient is dehydrated. This can be overcome by wetting the patient's finger prior to therapy localization. Of course, it is important to advise that he drink more water. Other factors that will often interfere with therapy localization to the TS line are hair oils, sprays, and conditioners. Generally, wetting the finger will also overcome these obstacles, or the substance can be washed off with alcohol.

Palpating the TS line is generally the first step in an examination; it saves a considerable amount of time in finding problems, as well as in finding areas that would not be noticed without it. When first learning the TS line, it is valuable to reverse the procedure. First find the weak muscles, then locate the TS line point. This enables the examiner to feel active TS line points and differentiate them from surrounding tissue. The active TS line point can be confirmed by therapy localizing it and testing a previously strong indicator muscle for weakening. After the doctor gains confidence in feeling active points along the TS line, the examination should begin with its evaluation.

Hidden Problems

Periodically it will be observed that a seemingly active TS line point does not have an apparent muscle weakness associated with it. This was confusing when the TS line was first used, and caused many to quit using the line because of its "inaccuracy." As applied kinesiology has evolved, it has been found that there is, in reality, an involvement associated with all positive TS line points; however, the muscle weakness is subclinical. Goodheart called this a "51 percenter," meaning that the muscle was not functioning 100% normally but above the level that could be observed by manual muscle testing "in the clear." A subclinical



3—48. *Temporal Sphenoidal Line*

muscle weakness can be uncovered easily by challenge, therapy localization, etc. An example of a subclinical weakness is when a reflex point is active, but its associated muscle is strong. This is revealed by therapy localizing the reflex point, causing the associated muscle to weaken. After adequate treatment to the reflex point, the associated muscle will no longer weaken. Subclinical muscle weakness is probably associated with the body's effort to maintain normal function by shifting various energy patterns. (This will be discussed throughout this series of texts, especially in reference to the meridian system.)

If a positive TS line point is present and the associated muscle or muscles is not weak, it may be due to the manner in which the patient is tested. For example, there may be indication of neck flexor weakness, yet the muscles test strong in the supine position. When the patient is in a weight-bearing position, the neck flexors test very weak. The TS line has been very valuable in finding this type of "hidden problem." The problem is there; it simply does not show up because of the manner or position in which the patient is tested. When there is a positive TS line point, the associated muscle(s) should be evaluated until the problem is found.

Cranial Correlation

TS line points correlate with the respiratory assistance observed in cranial faults. Positive therapy localization of a TS line point, using a previously strong indicator muscle, can be evaluated for respiratory assistance by testing at the various stages of respiration. When a phase of respiration is found that abolishes the positive therapy localization, it is indication of a cranial fault correlating with that phase of respiration. (This is discussed more thoroughly in Volume II of this series.)

Permanency

The TS line nodule will disappear when effective therapy has been administered. The more effectively the involvement is treated, the more quickly the nodule will disappear. If treatment is complete and effective, the nodule may be gone within twelve hours. Nodules will often disappear immediately after cranial treatment. If the nodule does not go away, or if it returns, all factors involved have not been located and/or treated successfully. Conditions which have continuing adverse factors, as relative adrenal insufficiency often has, will have a persistent TS line nodule until effective treatment is accomplished.

Not all problems that are diagnosed in applied kinesiology will be revealed on the TS line. A muscle malfunctioning because of injured proprioceptors within it will not be revealed on the TS line unless the condition is allowed to persist long enough that ultimately the neurovascular or neurolymphatic reflex, etc., becomes involved. At that time, the TS line will reveal the problem, but care must be taken that the entire condition is corrected. For example, a muscular weakness is revealed by a TS line nodule. It is treated by one of the five factors of the IVF, and a proprioceptor dysfunction remains. The TS line nodule will no longer be present, but it will return rapidly as the secondary factors again appear.

Mastering the TS line requires persistent effort on your part. By palpating the line on every patient and correlating it with your findings, you will discover what a tremendous asset is available through its use. A recurring TS line nodule will haunt you until all the factors causing its persistence are found. Removal of additional factors will insure the patient's rapid recovery.

Meridian System

The meridian system is a diagnostic factor in applied kinesiology and also a therapeutic approach. Because the meridian system is involved with all body functions, it is an extremely valuable tool, constituting the third major diagnostic factor in applied kinesiology. Knowledge of the meridian system gives an investigator significant assistance in interpreting body language.

The interrelationship of the energy patterns between the meridians in classic acupuncture is called the five-element theory. In this theory, various energy patterns of the body are associated with specific factors of climate, seasons, emotions, fluids, and taste, just to name a few. Consequently, if a patient's condition has exacerbations with cloudy weather, springtime, or fear, there is indication of the energy pattern and organ involved. Likewise, if a condition is accompanied by a watery fluid or a salty taste, specific energy patterns are indicated. Many clues can be derived from the associations made in classic Chinese medicine. The meridians are also associated with specific time factors in the 24-hour day. If a patient develops a headache or some other condition at a specific time every day, the doctor familiar with the meridian system's 24-hour energy pattern has a clue where he should look for the cause of the patient's condition.

Knowledge of the meridian system and how to examine it is very valuable, even though the doctor may not use the system as a mode of treatment. Many factors — such as spinal correction, nutrition, structural balancing, and improvement of mental attitude — will affect the energy patterns of the meridian system. Many therapeutic approaches used actually work through the meridian system; however, the practitioner may be unaware of the interrelationship. In the practice of chiropractic, vertebral manipulation often influences the meridian system via the acupuncture "associated point," which is adjacent to the spine. An injury to the ankle or foot can interfere with energy traveling through one of the six meridians in the area, influencing an organ remote from the ankle injury. Correction of the structural problems caused by the ankle injury returns the energy flow to balance. The organ or gland returns to normal; the doctor working on the ankle may never know he influenced the organ or gland, which

was a problem secondary to the trauma.

If for no other reason than use as a diagnostic aid, all practitioners in the healing arts should be knowledgeable about the meridian system and its influence on the body. It is a **must** if body function is to be understood to the fullest possible extent. Applied kinesiology makes it easy to understand the meridian system and its interrelation with other systems of the body. In classic acupuncture, there are several body language factors that indicate imbalance of a meridian, such as tenderness at an alarm point. Applied kinesiology aids in the use of this acupuncture diagnostic point because the involved alarm point will therapy localize and challenge. Because of the muscle association with meridians, it is easy to determine whether the meridian is overactive or underactive. Evaluation of the meridian system, combined with chemical testing, will often indicate nutritional support needed by a remote organ or gland which will influence another area where the patient is experiencing symptoms. Without knowledge of the meridian system, many of these hidden problems could not be uncovered. It is a significant diagnostic aid, and is thoroughly covered in Volume III of this series.

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Chapter 4

Chemical and Nutrition Testing

The body's reaction to chemicals, including nutrition and adverse chemicals, can be tested by manual muscle testing. This influence will be revealed by a muscle strengthening or weakening, depending upon the compound being tested. Upon administration of the compound, there is an immediate influence on the muscle function. This suggests that the influence is by way of the nervous system. The neurologic pathways that influence muscle strength — either positively or negatively — are speculative. It is obvious there is brain activity as soon as a substance is chewed; we immediately know whether we like the substance or not. This, of course, is from stimulation of the nerve endings dealing with taste. It is possible that the central nervous system, recognizing the compound being ingested, relays information to the organs and glands, preparing for use of the compound. If the compound is recognized as beneficial, the energy pattern is immediately enhanced, influencing not only the organ or gland, but also the associated muscle.

Possibly involved with the neurologic correlation are food energy patterns of which we are not currently aware. This is an area which requires considerable research. A preliminary investigation was done by this author to determine if nutritional products could be distorted in a high frequency energy field. Several types of nutrition were irradiated in a microwave cooking oven and then used in testing procedures in a routine clinical practice. The irradiated material was effective only occasionally, but nutritional products which had not been irradiated were effective as would usually be expected. The test was done on a blind basis; a support person provided the nutrition, and neither the patient nor the doctor knew what nutrition was being tested. This preliminary study requires follow-up on a double-blind basis with statistical correlation. As will be seen later in this discussion, developing this kind of study presents difficulties because of the various types of nutrition available and the patient's biochemical individuality. Also, when testing nutrition, it is not known in advance whether the patient needs it, or if a response should be expected.

In addition to nerve stimulation, absorption — possibly of different varieties — is taking place in the mouth. Much of the stimulant effect of tobacco has been found to be from oral absorption of the nicotine. This appears to be true whether the nicotine is taken in the form of smoking tobacco or chewed, as with chewing tobacco or snuff. Snuff is also used by inhaling it into the nose for absorption there. There may be some lingual, sublingual, buccal, and nasal absorption when the compound is introduced in the oral cavity.

Evidence of actual absorption is found in a study on "A Direct Pathway to the Brain."[6] Isotopically labeled glucose and sodium chloride were introduced into the oropharyngeal cavity of a rat. The esophagus and trachea were ligated proximal to the submaxillary gland. The experimental rat was able to breathe through a slit in the trachea below the ligature. The labeled glucose and sodium chloride were left in the oropharynx four minutes; then the material was rinsed out with distilled water. The animal was then quick-frozen in liquid nitrogen. Radio tracer studies found the isotopically labeled glucose and sodium concentrated in the tissues of the face region and clearly in the intracranial cavity and in the brain. None of the active material was found below the ligation, including blood samples taken from the heart. This indicates that there was no absorption into the bloodstream; therefore, it was not due to sublingual absorption. In control animals, the isotopically labeled glucose and sodium chloride were placed directly into the duodenum, and distribution throughout the body was apparent. This indicates an absorption pathway for chemical compounds other than through the digestive system.

Iodine, nitroglycerin, and other compounds are administered sublingually. Their effects on the body are observed in a minimal amount of time.

There are physiologic activities which take place in the chewing of food products other than those known. This seems obvious, since skipping this stage of ingesting food is detrimental to an individual. A standard procedure for children with major damage to the esophagus, from swallowing lye or other caustic materials, is to feed them through a stoma cut into the stomach. Even though the ground-up food is nutritious and well-balanced, these children do poorly. General debility, weight loss, and anemia develop. Specific involvements, such as kidney stones and arthritis, may also occur.[7]

An experiment was performed on children with destroyed esophagi but intact oral cavities. They chewed the food; after complete mastication, the food bolus was placed in the stomach through the stoma. These children made a remarkable recovery in their total health picture.

Testing Methods

There is a specific protocol for testing chemical compounds in applied kinesiology. This protocol has been developed as the most consistently reproducible. The best method of testing nutrition and other compounds is to place the substance in the patient's mouth on his tongue, so that he tastes the material, and test the muscle to determine possible change. It is not necessary for the patient to swallow the substance for the change to take place.

The procedure is as follows. When an organ or gland — such as the liver — is dysfunctioning, and its associated muscle — the pectoralis major (sternal division) — tests weak, a substance which may help the liver, such as vitamin A, is placed in the patient's mouth; the pectoralis major (sternal division) is tested to see if strengthening is obtained. If so, the nutrition tested is applicable for treating the condition.

Various types of nutrition which have been found to correlate with the muscle-organ association in applied kinesiology are listed in the muscle testing section of this book. Several types of nutrition are listed for most muscles. These are not specifically to be used when a weakness is found; testing must be accomplished to determine which, if any, are applicable. The list is not all-inclusive, as other nutritional products may occasionally be applicable for the muscle-organ/gland association.

Adverse Compounds

Adverse effects of chemicals on the body can be determined in the same manner that nutritional benefit is examined. If a food product, nutritional item, or environmental chemical is detrimental to the body, it will weaken an associated muscle. For example, in most cases the latissimus dorsi, associated with the pancreas, will weaken significantly when refined sugar is placed into the mouth of an individual with diabetes or hyperinsulinism. It must be remembered, however, that the patient with hyperinsulinism may be in a hypoglycemic state at the time of the test. In this case, the sugar may strengthen the latissimus dorsi. Chemicals toxic to the body — such as carbon tetrachloride — will especially weaken the pectoralis major (sternal division) associated with the liver. Alcohol will weaken the sartorius and gracilis muscles in an individual with relative hypoadrenia.

General Effect

It can be generally observed that all muscles of the body will show a temporary weakening when harmful chemicals are administered. (When general muscles weaken in this manner, they are known as "indicator muscles.") In the same manner, several weak muscles may strengthen with a nutritional factor needed by the body, not just the muscle associated with the deficient organ or gland. Even though muscles in addition to those associated with the specific chemical compound change strength, it is important to evaluate the body using the known association between muscles and organs or glands.

Interaction

Sometimes the nutritional support needed by the body is not apparent from symptom complaint and initial applied kinesiology evaluation. For example, the patient may have hypothyroidism; nutritional support directed to the thyroid makes no improvement in muscle strength. Another gland in the endocrine system may be involved with the hypothyroidism on a nutritional basis. The examination procedure is done with double-handed therapy localization, and nutritional supplementation is examined following the results of this examination. Example: have the patient place his hand on a thyroid reflex area, and test a strong indicator muscle. If the muscle weakens, thyroid involvement is indicated. Have the patient chew thyroid substance and/or iodine; re-therapy localize. In most instances this will neutralize the therapy localization. If there is no change, have the patient place his other hand on another gland or organ — such as the adrenals — while continuing to therapy localize the thyroid. Re-test the indicator muscle. If there is no change, continue with other organs or glands until you find the one that neutralizes the thyroid therapy localization. If therapy localizing the spleen cancels the positive thyroid therapy localization, there is indication that the spleen is also involved. Have the patient chew spleen substance or vitamin C, and re-test the thyroid reflex area with single therapy localization. The thyroid reflex area will not therapy localize now if the spleen substance helped the problem.

Inhalation

Chemical compounds can be tested very effectively by inhalation. Brimhall[3] reported that heavy metals, when ingested in water or food, were absorbed five percent; when vapors of the same amount of heavy metals were inhaled, there was approximately thirty to forty percent absorption.[13] He applied this philosophy to the testing of homeopathic preparations and Bach flower remedies[4] by inhaling the vapors and testing the effects by manual muscle testing. The results in specific conditions, such as upper respiratory involvements, thymus dysfunction, etc., were positive. He administered the compound by placing the dilute remedy in a vaporizer. The effects were beneficial clinically, and were observed by manual muscle testing. Many types of remedies and nutritional factors can be administered by inhalation. This is especially beneficial to patients who have an absorption problem through the gut.

Questionable Procedures

It has been claimed that chemical compounds affect the body when they come within its energy field or touch the skin. Many have used manual muscle testing to evaluate nutrition and adverse chemicals by having the patient hold the substance in his hand, lay it on his abdomen, or even hold the bottle containing the substance in his hand or lay it on his abdomen. Although these procedures will often change muscle strength, they have not been shown to be consistent methods of testing compounds. One factor that causes widely variable results

is the influence of color on muscle strength when it comes in contact with the skin. There have been several studies of the influence of color on the skin[14, 12] and of skin photoreceptors.[10, 11] The influence appears to be from receptors in the skin which have not yet been researched and understood. Goodheart demonstrated at the 1978 winter meeting of the International College of Applied Kinesiology that many types of hand-held nutrition would influence muscle strength as long as the nutrition was of the same spectroscopic color. However, only one type of nutrition would influence the muscle if the various compounds were placed in the mouth. Until the variables have been thoroughly evaluated regarding the influence of chemical compounds on the skin and energy fields around the body, the compounds should be tested only in the oral cavity or by inhaling the vapors.

Many who have not thoroughly studied applied kinesiology use manual muscle testing to evaluate nutritional compounds. This is an area where there is great potential for error. Nutritional testing is only one part of a very large picture of body function. Accurate evaluation of nutrition by manual muscle testing requires the examiner to have a thorough knowledge of all the interrelating aspects of body function. It is a rare food compound which will cause the same reaction in every individual to whom it is administered. There are many who think white sugar is detrimental to everyone, and that honey does not adversely affect anyone. Neither is true. There are certain metabolic types who can handle refined sugar quite well; on the other hand, there are those who cannot tolerate honey. A philosophic attitude can be so strong that operator prejudice interferes with obtaining accurate information in the testing process.

NUTRITIONAL COMPOUNDS AND PATIENT INDIVIDUALITY

It appears that one of the major advantages of applied kinesiology testing is that it makes each situation an individual consideration. This is especially valuable when considering an individual's need for nutritional supplementation. Even in a healthy state there is biochemical individuality, as reported by Williams.[15] The requirement of an individual having health problems becomes even more specific. Prescribing nutrition on a strictly conditional basis does not take into consideration this individuality.

Nutritional compounds manufactured by various companies significantly vary from one another, even though the labels may read the same. This is because of different processing methods and sources of material. In some instances, one product may be the viable approach for one patient, while for others a different product is necessary. The variance among products and the individual requirements of patients are excellent reasons for testing nutritional products in the patient's own laboratory — his body.

Allopathic or Nutritional?

There are two approaches to the use of nutrition. The megavitamin approach, advocated by many, is basically an allopathic approach to nutrition. That is, a nutritional product is given to create a specific response in the body, frequently to counteract some health problem or potential health problem. Nutrition, when used in a megavitamin dosage, is commonly a synthetic product rather than one concentrated from actual food sources. To have natural product nutrition in megavitamin concentration might require tablets the size of baseballs. A label on a product stating that it is natural does not necessarily mean that it is 100% so. For example, vitamin C can be labelled as natural simply by having some natural rose hips in the product; the product is then brought up to the label dosage with ascorbic acid.

Whenever a therapeutic approach is allopathic in nature, there is the potential for side effects because of the effort to effect a change in body function. In essence, the doctor or therapist is trying to control the body, rather than releasing it to return to a normal state of health on its own.

Some nutritional products are processed, concentrated, and packaged to maintain the product in as natural a state as possible. These products are low in dosage, and an attempt is made to maintain the natural synergistic factors with the nutrition, as nature developed them. The nutritional product with its synergists present is in a state that the body can use.

Synthetic vitamins in pure crystalline form are concentrated and use the body's co-factors. This creates the possibility of depleting the body of these necessary items, creating an actual deficiency where none was present. In addition, if the synergistic products are not present, the synthetic vitamin is rarely of any value. Megavitamin dosages of synthetic products can create vitamin toxicity, as is well-known with the fat soluble vitamins. Obtaining the same amount of vitamins from natural food products would require ingestion of such large quantities of food that hypervitaminosis is highly improbable.

It is increasingly evident, in working with nutrition and analysis of the modern-day diet, that the refining and concentrating of food products causes major health problems. The concentration of wheat products into white flour and the elimination of the total carbohydrate, which includes indigestible cellulose, are significant problems to the bowel, as there is not enough "roughage" for a carrier medium. Cellulose is a synergistic material to the refined carbohydrate, even though it may only be one of a mechanical nature. Refined crystalline sugar has lost the synergists that help metabolize the sugar, such as the B complex of vitamins.[5, 2] There is a union of the vitamin B complex and carbohydrate in natural foods. The processing and refining of these foods has divided away the synergistic material necessary to metabolize the carbohydrate. High ingestion of this refined carbohydrate creates a deficiency of the B complex. In natural food products, there is an automatic increase of vitamin B complex ingestion when carbohydrates are increased.

When many nutritionists are very concerned about the detrimental effects to health from the refining and concentrating of foods, why do they not also understand that refining, concentrating and synthesizing nutritional products can create similar types of imbalances in the body,

causing health problems? It is not unusual to find that all of the body's muscles weaken when a high potency synthetic vitamin is chewed.

Muscle testing can be used to determine if a nutritional product is a problem to the patient. An example is determining if potassium is problematic to an individual with relative hypoadrenia. In this condition, the body often retains, with consequent excess, potassium. To determine if the potassium in orange juice is a problem to this person, have him drink some (unsweetened) and test the sartorius muscle, associated with the adrenal gland. If it weakens, it indicates the juice is harmful while the patient remains in the hypoadrenic state.

The body's nutritional requirements are easily determined with applied kinesiology use of manual muscle testing. In some conditions, the natural low potency concentrations of nutrition with their natural synergists are the best approach; in other conditions, the allopathic approach to nutrition is desirable. An example is various types of circulatory disturbances. In general, when a patient has a functional circulatory disturbance in the lower extremity, there will be a response observed on manual muscle testing when a low potency (2 IU) natural source of vitamin E_2 is used. On the other hand, when the circulatory disturbance is associated with a pathological condition, such as phlebitis, a high potency (200 IU) will usually be the substance which improves muscle strength; the low potency vitamin will not. It is not unusual to find that high potency vitamin E causes muscle weakness in the patient with a functional circulatory disturbance for which the low potency vitamin E_2 was effective.

Glandular Nutrition

Another type of nutritional support that is gaining popularity is glandular substances. Glandular products consist of substances prepared by different manufacturers in varying ways and usually taken orally. In some foreign countries, fresh cellular injections are also used; however, that discussion is outside the scope of this text. The three types of glandular materials used in the United States are whole glandular concentrates, nucleoprotein extracts, and tissue or extracts containing hormone substances. The various companies producing glandular substances all seem to claim that their processing method is better than any other. This may be true, depending on the body's need and the goal for the product's usage. It is obvious that each end product is different; AK evaluation often shows that one company's product will show a positive effect on a patient whereas another company's product will not. Glandular substances have not received the thorough research that clinical results indicate they deserve. Explanations of the effects of glandular substances are largely hypothetical, awaiting further testing.

Whole glandular concentrates are dehydrated concentrations of total glandular material, usually from bovine or porcine sources. Concentration may be by a heat process, cold process, complete elimination of fat, or limiting the fat content to small amounts. Various companies have additional claims for the value of specialized processing methods. The bottom line is always how effective the product is when tested in the patient's body, where it will be used. Generally the explanation for the way the whole glandular complex works is that it provides the basic raw material from which the body rebuilds damaged or poor quality tissue.

Nucleoprotein extracts are not whole tissue, but rather are nucleoprotein extracts from the cells of specific tissue. It is theorized that when the tissue of a gland or organ breaks down and enters the blood stream, it acts as an antigen, requiring the body to build antibodies against the foreign molecule. If these antibodies are out of control, the body is unable to rebuild the damaged tissue because the antibodies counteract the rebuilding process. When this problem is present, something must counteract the overactivity of the antibodies against tissue rebuilding. The nucleoprotein extract is said to de-activate, or use up, the antibodies.

The third type of tissue substance is the hormone-containing substance. Some of these products are prescription items, such as natural thyroid, adrenal cortical extract, and some of the natural estrogens and progesterones. There are some glandular products available as nutritional products, such as thymus, ovary, and prostate. These are available without prescription. These products provide the actual hormone for the individual when the gland is unable to produce it. This is of value in some conditions where a return to normal is retarded or impossible, such as bilateral oophorectomy or thyroidectomy. In the case of complete adrenal shut-down, a supplemental supply of its hormones is necessary to sustain life.

For some patients, one of these products may be the product indicated for treatment; for others, treatment may require two, and in some, all three products. It is relatively easy to determine which product is applicable with the testing procedures described here.

Nutrition Dosage

There is no satisfactory method for determining dosage requirements with applied kinesiology. The best method to date is to determine initial dosage empirically, then adjust according to the amount necessary to maintain normal function of the associated muscle.

Frequency of nutritional administration is just as important as amount. In severe conditions, it is often of value to have the patient chew a nutritional tablet every 15 minutes throughout the first day or two. The tablet may even be cut in half and given this often. Continual administration may be more important than giving the same dosage three times per day. This is especially true when the nutrition is chewed.

Systems have been proposed to determine dosage by muscle testing; however, they have not generally been accepted by most members of the International College of Applied Kinesiology. The methods generally relate to adding quantities of nutrition until a muscle weakens, then using this amount to calculate the dosage.

There has been no evidence that these methods of determining nutritional dosage are effective. Clinical evidence indicates the efficacy of lower dosages than those indicated by attempted evaluation with muscle testing. Repeated testing at various times of the day gives different results with either of these methods. Because of the lack of

reproducibility and of standardized procedures, the approaches must be questioned.

Administration of Nutrition

Swallowing nutrition in tablet or capsule form is basically the same as placing the product directly into the stomach and eliminating the chewing process. This is equivalent to placing food directly into the stomach through a stoma in children who have their esophagi destroyed by caustic chemicals. Swallowed nutrition can be expected to give a similar nutritional benefit as food that has not been chewed and is placed directly into the stomach. Clinical results, as well as those obtained from muscle testing, indicate much better use of food products and improvement in health when the product is chewed. Unfortunately, many nutritional products needed by the body are rather strong and have a bad taste. Nevertheless, it is important that the patient chew the material. Remember, however, that hydrochloric acid tablets should **not** be chewed because it will break down tooth enamel. Of course, hydrochloric acid is not a nutritional product; it is an allopathic approach. Hydrochloric acid is not a natural food product. It should be manufactured by the body.

Some patients will not chew nutrition because of the bad taste, nausea, or frank mental objection. Most will agree to suck the nutrition long enough to get a distinct taste, which will activate some of the oral processes. After sucking the tablet or powder, the patient can swallow the material. There is no problem in rinsing the mouth with water or some tasteful juice such as orange juice, provided there are no contraindications, e.g., hypoadrenia. Occasionally a patient simply will not cooperate, even with sucking the nutrition. This problem individual will obtain some value from simply swallowing the nutrition; however, his clinical results will not be as effective, and he will probably need heavier dosages.

After using nutrition in this manner for some time, the doctor will easily recognize those patients not following directions to chew nutrition. Confront the patient with a direct statement such as, "As we do these tests, it's obvious that you're not chewing the nutrition. You'll do much better if you start chewing it as we suggested." At this positive direct confrontation, the patient will generally admit that he hasn't been chewing the nutrition. The simple question, "Are you chewing your nutrition?" will usually bring an answer of, "Oh, sure."

The number of patients cooperating and chewing nutrition will be dramatically increased by the doctor's — or the support person's — effort to motivate patients accordingly. It is valuable to explain to the patient that the nutrition is not merely a raw material with which the body builds; it also includes neurologic aspects. This will become obvious as the patient sees the immediate and dramatic change of muscle strength when the substance is chewed rather than swallowed.

Many patients take nutritional substances that are of no value to them. This can be a problem, especially if the patient sells the particular brand of nutrition. There are also times when patients compare the cost of the nutrition you recommend with that which can be purchased in supermarkets or health food stores. If, when you recommend a specific nutritional supplement to a patient, he tells you he is already taking it, it is best to simply say, "Wonderful! Bring some in on your next visit and we'll test it to see how it is influencing this particular problem." If you have good rapport with the patient, it is easier to say, "What you're taking apparently doesn't have the factors required to correct this particular problem. You noticed that when you chewed this product, it strengthened the muscle. If what you're taking was adequate, you wouldn't have the problem." If the patient brings the nutrition on his next visit, test it; have him chew it, then test the muscle. If there is no response, test the product you recommend and show him the change in function.

There are certain brands of nutrition which use carriers, food colorings, and additives that are consistently detrimental to body function. The effects of these products can be observed on manual muscle testing. After chewing the product (or sucking on it), general indicator muscles of the body will weaken. Some of these products are sold by lay people on a home visit basis, or in a health food store. You probably will have some of them as patients; in fact, applied kinesiology examination will sometimes show that the health problem about which the patient complains comes from the nutrition he sells and takes himself.

Parotid and Thymus Role

Until recently, the thymus gland was very much overlooked in the adult. A thorough description of thymus function and testing is found in Volume V; here we will discuss only the hypothesis of the thymus role in nutritional absorption.

Goodheart[8] hypothesized that the thymus, being an auto-immune gland that processes ribonucleic acid, codes the RNA released from dead cells by antigen-antibody reaction as a result of tissue degeneration. After this coding, the RNA is secreted by the parotid during the chewing process. The coded RNA from the saliva coats the food, tagging it for specialized use in the body. This gives a selective use of the available nutrition to regenerate the areas of degeneration.

This hypothesis resulted from the observation that when thymus nutritional support was tested, it would not influence any muscle other than that associated with the thymus (infraspinatus). Parotid glandular substance likewise caused no major change. When thymus and parotid substances were placed in the mouth together, weak muscles associated with the endocrine system strengthened. Use of nutrition for specialized areas, such as the adrenal, ovaries, etc., was enhanced when thymus and parotid substances were administered with the specialized tissue. This activation and correlation of nutritional products in the chewing mechanism seems reasonable because of the necessity of chewing nutritional products.

DEHYDRATION

A large percentage of the population is dehydrated. Body language signs indicating this are dry, scaly skin, edema, dryness of secretions such as in the mouth, etc. The patient with consistently active neurolymphatic re-

flexes, or general congestion of the lymph system, is usually dehydrated and requires a large quantity of water to improve lymphatic flow.

Reaction to a nutritional product indicated by AK testing may be inhibited by dehydration. There simply may not be enough water for the nutrition to be processed; it stays in the concentrated state. There may also be insufficient water for adequate enzyme activity.

The applied kinesiologist will recognize dehydration by the patient's inability to therapy localize. When the patient is dehydrated, therapy localization can be increased significantly by wetting his fingertips. Another indication of dehydration is general muscle weakness throughout the patient's body. Interestingly, drinking a fresh glass of water will usually cause muscle strength to immediately improve throughout the body, while a glass of juice, tea, or other beverage primarily made of water will not improve muscle strength. This is apparently due to the processing in the oral cavity, signaling the body that a food product or a stimulant is coming instead of water. Thus the body considers these items as either nutrient or stimulant; its immediate reaction is different than to plain water.

Observing dehydration brings up the question of how much water a person drinks. Dehydrated patients often say, "I don't drink water. I don't like it," or "I can't drink water because I already have this swelling in my legs." The etiology of the edema may be lack of water. When toxicity is present for any reason, the body will attempt to dilute the toxins if it cannot remove them. The diluting process requires water retention, which manifests itself as edema. Increased kidney and bowel action by increasing water intake will often improve toxin elimination, thus improving the edema. This must be explained thoroughly to the patient, or the admonition to drink more water will be ignored. Of course, this advice must come only after evaluation for acute renal failure or congestive heart failure. In these circumstances it is important to replace fluid intake with water, not to supplement it.

The patient who complains that he doesn't like water should be advised to buy bottled or fresh artesian water. These waters are better for the patient, and there is also a psychological factor — they will taste better, especially if the doctor agrees that tap water has a bad taste.

The average person needs 6-8 glasses of water per day, and more during hot weather. The type of water and its mineral ash content, as well as pollutants, is of significant concern, but these are outside the scope of this discussion. The subject is covered more thoroughly in Volume V of this series.

GENERAL MALNUTRITION

Some patients with muscle weakness throughout the body are suffering from general malnutrition. It may be associated with a very poor diet, but it is usually the result of a malabsorption syndrome (which could also be from a poor diet). When general muscular weakness throughout the body is observed, have the patient chew a total nutritional product containing vitamins, minerals, and synergists proven effective in your experience. This will often produce significant muscular improvement. If this is the case, evaluate the digestive system, thymus, parotid, and other factors as outlined in Volume V, and recommend the total nutritional product.

RIBONUCLEIC ACID

Memory

Ribonucleic acid (RNA) has been shown to be a factor in cellular memory. The RNA molecule is a long molecular string with a configuration similar to that of a spiral staircase or twisted ladder. RNA provides the ladder siderails upon which the rungs of memory build.

Both the chemical and the neurologic natures of memory were demonstrated in a unique planarian experiment at the University of Michigan. Two groups of worms were raised in the same environment and fed the same food; however, the groups were fed in different ways. Group A received a small electric shock and a light went on each time they were fed. Group B also received the electric shock and the light went on, but at random times not coinciding with feeding. In Group A, a conditioned response developed for food; there was no response in Group B. In other words, these relatively primitive earthworms received an education and developed a memory pattern.

At one stage of their existence, planarian earthworms are cannibalistic. The worms from Groups A and B were sacrificed to two more groups of worms. These were raised in the same environment, but without the electric shock and light turn-on. Group AA, which was fed the worms from Group A, had education in the form of a memory pattern transmitted to them. When electric shock was administered and a light turned on, a significant number of the worms went quickly to the site where food was provided. The worms in Group BB, which were fed the worms without the conditioned response, showed no effects from the electric stimulation and light.

A similar experiment was done by Babich.[1,2] In this case Group A rats were trained to press a lever for food when a blinking light was on. Group B was trained to press a lever for food when a click was sounded. RNA was then extracted from the brains of both Groups A and B and injected intraperitoneally into untrained rats (Groups AA and BB). Group AA responded more frequently to light than clicks, while Group BB responded to clicks more often than to light.

Other researchers have tried various experiments in which RNA from trained animals has been injected into naive animals, attempting to transfer memory. Some of these experiments have been successful and some unsuccessful. It is obvious that there is much unknown about RNA and memory; however, it has been clearly established

that there is a chemical factor to memory.

Memory changes in some geriatric patients may be due to an inadequate amount of RNA synthesis to provide the ladder siderails for the "memory rungs." Thus long-term memory, of events which happened in childhood, is good, but short-term memory, for recent occurrences, is poor.

In an attempt to evaluate the chemical aspects of memory, Goodheart[9] equated the need of memory function to perform the Romberg test. First it is necessary to determine that there is no neurologic pathology demonstrable by other cerebellar and posterior column signs; the usual applied kinesiology corrections, including the five factors of the IVF, fixations, foot subluxations, etc., are achieved. Under these circumstances, an individual should be able to stand with his feet together without swaying and falling.

Goodheart hypothesized that short-term memory is required to maintain orientation in space. The test he devised to determine if RNA would improve short-term memory requires recording the length of time an individual can stand on one foot with his eyes closed. It is helpful to let the patient stand on one foot for a short time before closing his eyes. The patient is timed to determine his ability to stand on one foot with his eyes closed. Timing can be repeated several times to determine if an increased time is a learned process. Nearly all people needing RNA can maintain the one-legged stance with closed eyes only a very short time; their ability to do so does not increase with practice. The patient is then given a tablet of RNA, or RNA in combination with brain substance, to chew. The test is repeated, and any improvement is noted. If there is none, ask the patient to chew another tablet and re-test. Continue this procedure until definite improvement is observed. The test is considered adequate as long as the patient can maintain his balance without opening his eyes. Often the patient can maintain balance by moving his foot. It may be necessary for him to chew many tablets before a change takes place. The number needed to effect a change gives some indication of the dosage to give. The most important factor is to re-check the patient's balancing time on subsequent visits, regulating the tablets accordingly.

If balancing time decreases when RNA is administered, a very small homeopathic type dosage is indicated, possibly on a frequent basis. Some people are very sensitive to this material when chewed. The frequent and very small dosage re-establishes normal memory in them.

If the patient consistently falls in one direction, re-evaluate the upper cervicals for subluxation or fixation; this area is very important in reference to the righting reflexes. The feet may also have subluxations, influencing foot proprioceptors.

In addition to improved balance and nerve function, many patients will comment about improved memory. Older individuals often need RNA for improvement in their balance and memory ability.

RNA for Finding Hidden Problems

The body has a memory or a record of everything that has ever happened to it. Even though that record is present at all times, it cannot always be drawn out at will. Therapy localization and challenge request the body to give information from the record. If that record is available and easily obtained, the body releases the information. Sometimes the record is not so easily drawn out, making the requested information more difficult to come by.

When a patient chews ribonucleic acid, the memory pattern of his body is enhanced and the information more easily elicited. This mechanism of finding hidden problems is especially valuable when body language, the symptomatic picture, TS line indicators, and other diagnostic factors indicate the presence of a problem, but it is not revealed on muscle testing.

Many times doctors using applied kinesiology have observed that the indicated treatment improves a patient significantly, to the point that he is pleased with the therapy; yet his climb to health reaches a plateau, and no longer improves. This plateau is maintained even though all indicators show no problem remains. For example, the patient may have had a category II, PI ilium; it was corrected and improvement was excellent. However, the condition recurs periodically, even though examination reveals an intact sartorius/gracilis, good adrenal function, etc. When this type of plateau has been reached, it is advantageous to have the patient chew one RNA tablet (a single RNA tablet is adequate for the average-size adult; however, if the individual is large or overweight, more RNA tablets may be necessary). If there is a hidden sacroiliac problem, the articulation will now therapy localize as positive. Treatment should consist of the original successful therapy. This revelation of a hidden problem simply indicates that the problem improved to the point that the body no longer showed the deficiency by therapy localization; however, it was not completely corrected.

RNA's Role With Medication

We are well aware that medication can often interfere with the energy patterns of the body, confusing them to such an extent that either no information is obtained from applied kinesiology examination, or what is gained is erroneous. Some of the worst offenders in this category are tranquilizers, birth control pills, diuretics, and neurologic depressants and stimulants. Here again ribonucleic acid comes to our aid.

A typical example is an individual with emotional problems, severe fatigue, shakiness, headaches — the list of symptoms indicating blood sugar handling problems could go on and on. The patient had seen other doctors; tranquilizers such as Valium® were prescribed. When this individual comes to your office as a new patient, he is taking the medication. Your consultation shows every evidence of blood sugar handling stress and hypoadrenia. The patient even complains of sacroiliac pain, correlating with a leg shortness on that side and indicating a category II, PI ilium. Upon examination, this patient may show any pattern — many weaknesses, or no weaknesses at all. You find nothing correlating with the consultation and body language. It may seem that the patient has neurologic disorganization, but testing does not reveal this either. You recognize that this pattern is a result of body disturbance caused by the medication.

Attempts have been made to withdraw these patients from medication, or perhaps treat them by "educated

guess," each of which is obviously a problem. RNA can be used to help uncover the actual condition. Have the patient chew RNA and re-examine. If there is no change, have him chew additional tablets until the appropriate pattern emerges. It is sometimes necessary for the patient to take a large number of RNA — perhaps 10 or 11 tablets — before the abnormal medication pattern is overridden.

In the example just given, if the patient was negative for weakness or therapy localization prior to chewing the tablets, there will be a change when the necessary amount of RNA has been reached. The sartorius weakness will suddenly appear, together with the rest of the patterns appropriate to the patient. RNA, of course, will not override all the adverse effects of the medication; ultimately it will be necessary for the patient to decide to stop using the medication. RNA does, however, help us find the hidden problem.

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Chapter 5

Spinal Subluxations

Various Approaches

A subluxation within the spinal column can cause various health problems throughout the body. This, of course, has long been known and well accepted within the chiropractic profession. Even with this wide level of acceptance, the exact mechanisms of the vertebral subluxation are not known. Many have hypothesized about the subject, and theories abound.

The meric system of spinal adjusting offered a specific vertebra or vertebrae to adjust for different diagnosed conditions. First a diagnosis of the health problem was made; then from a study of the nerve distribution, a vertebra or vertebrae was manipulated for the condition. The approach was a "this for that" or a "cookbook" approach.

Others developed systems and analytic instruments to locate areas in the spinal column which were functioning improperly, to determine the location of the subluxation. It was then adjusted, regardless of the patient's symptoms. This advance in spinal analysis proved to be a significant improvement, because subluxations do not always correlate with a specific level for a given condition.

The direction for corrective adjustment of the vertebra is often determined by x-ray evaluation of the spine. Although this has been a valuable method for determining corrective procedures, it leaves much to be desired because: (1) if actual spinal column changes are made, the x-ray quickly becomes obsolete for the patient's current condition; (2) re-evaluation by x-ray gives the patient unwanted radiation; (3) congenital anomalies, such as the asymmetric development of articular processes, can lead the evaluation astray; and (4) most x-ray evaluation used today is static evaluation, which does not take into account the dynamic function of the body. There may be vertebral dysfunction, such as hypermobility, aberrant motion, etc., which will not appear on the film.

Even though x-ray has significant disadvantages in determining the correction, it is still necessary on a limited basis to observe for trauma, congenital anomalies, and pathology, such as osteoporosis, infections, malignancy, various forms of arthritic activity, etc., which may be contraindications to usual adjustive thrusts.

Palpation is one method used since the early days of chiropractic for locating subluxations and evaluating the correction necessary. The chiropractor must develop a high sense of palpatory competence early in his career. With this highly trained perceptive touch, he palpates for muscular imbalance, primarily of the rotatores longus and brevis and multifidus, position of the spinous process, transverse process, and ribs. More recently in the history of chiropractic, motion has been added to the palpatory methods.

Vertebral Challenge

Even with all the mechanisms developed to evaluate the location of subluxations, type of correction necessary and whether it is obtained, there has not been a quick, definitive method of making these evaluations. In 1972, a significant step forward in the evaluation of vertebral subluxations was made by Goodheart.[3] The system consisted of the examiner digitally pressing on the vertebra in various directions and locations, and immediately testing a muscle to determine change of strength. Goodheart named this procedure the "vertebral challenge." It has been widely used by doctors practicing applied kinesiology, with significant success. It provides the opportunity for evaluating the vertebral subluxation in an effective, efficient manner. The vertebral challenge offers the following advantages:

1. It determines exactly which vertebra is subluxated;
2. The precise direction of correction is revealed, regardless of whether the correction is in one plane only, or a combination of three planes;
3. After a corrective attempt is made, the vertebra can be re-tested immediately to determine whether the attempt resulted in an effective correction;
4. The patient can easily be tested in several positions and after specific types of activity, such as walking or running, or other dynamic motions, thus testing him the way he lives rather than lying on an x-ray table or an adjusting table for the physician's convenience;
5. The patient can be re-evaluated each time he returns to the office, thus giving dynamic information

as his structural balance changes and the spinal mechanism makes adaptations to the change.

Hypothesis of Vertebral Challenge

Vertebral challenge is closely linked with the muscles and nerves involved with the subluxation complex. This is extremely important, because the muscles must be significantly involved with the subluxation complex. Since the body is a self-correcting, self-maintaining mechanism, it stands to reason that many more subluxations are corrected by the body itself than by doctors in any field. The normal situation is for the muscles attached to the vertebra to bring it back into normal range of motion and balance, thus eliminating the vertebral subluxation. When a subluxation persists, it is only reasonable that the muscular system is out of balance, failing to return normal structural balance to the spinal column. The imbalance may be of the intrinsic muscles of the spinal column, or the more major postural muscles that indirectly affect the spinal column by gross structural distortions of the body.

The intrinsic muscles of the spinal column supply the reason for the vertebral challenge mechanism. The imbalance of these muscles has long been recognized by chiropractors and others involved in the evaluation of vertebral function and the manipulation of the articulations for correction of subluxations. They are easily palpated for the location of subluxations by those trained in the art.

With electromyography, Denslow and Clough[2] studied areas of the spine which they considered to be in "lesion." The lesion area was located by palpation of hypertonic muscle fibers. Control areas were selected which lacked the hypertonicity. In most cases, the study was done with concentric needle electrodes placed in the lesion and control areas while the subject was relaxed, prone, and with his head and face in the midline. The study revealed reflex muscle activity of the intrinsic spinal muscles in the area of lesion, and no muscular activity in the control area. In a few cases there was no hyperactivity found in the area of lesion. Their explanation for this was that no actual lesion was present, although one seemed to be indicated by palpation evaluation. Another explanation was that the presence of the electrodes inhibited the activity.

Denslow[1] made further evaluation of the intrinsic muscles of the spine by introducing mechanical stimulation to the vertebra while electromyographically recording intrinsic muscle activity of the spine. Needle electrodes were placed, six on each side, at equal intervals along the intrinsic muscles of the spine. The lesion areas were defined by palpation for muscle rigidity. These locations were probable vertebral subluxations. Mechanical stimulation to the vertebra was applied with a lucite block designed to give moving pressure to the vertebra. It was found that there was reactivity of the intrinsic muscles with lower thresholds of mechanical stimulation in the areas of lesion. The areas of lesion had more spontaneous motor activity evidenced on electromyography than the nonlesioned normal areas. The amount of pressure required to cause the muscle reactivity was found to be one to seven kilograms inclusive.

In an effort to determine the mechanism of the hyperreactive intrinsic muscles of the spine, the skin over the segment involved was infiltrated with 1% procaine hydrochloride, which did not change the threshold. Attempts were then made to block the periosteum and the supraspinous tissues with procaine hydrochloride without anesthetizing the skin. In all instances, the threshold was raised or the motor activity observed on electromyography decreased. Denslow's interpretation was that it is probable — but not certain — that these structures contain the receptors involved in the reaction since some blocking of skin sensation could not be avoided.

It seems appropriate that the proprioceptors within the joints and ligaments give afferent supply to the cord and possibly higher centers, which reflex efferently to cause the muscular imbalance clinically observed in the vertebral subluxation. This seems to give an explanation for a subluxation caused by structural trauma or strain.

It appears from clinical observation that the other two sides of the triad of health — chemical and mental — can also cause vertebral subluxations. This certainly isn't a new thought. In the early days of chiropractic, D. D. Palmer[9] stated ". . . poison acting on certain nerves irritates their structure. They, in turn, contract muscles which draw vertebrae out of alignment . . ." Palmer recognized three factors which created subluxations: "traumatism, poison, and autosuggestion." The only one of these which can create subluxations locally is trauma. Harper,[6] Homewood,[7] and others have elaborated on the mechanisms of an imbalance in the triad of health causing vertebral subluxations. Additional study is necessary to understand these mechanisms as possible causes of vertebral subluxations.

There appear to be two mechanisms by which the vertebral challenge works. First, the malposition of the vertebra — regardless of cause — stimulates the proprioceptors of the vertebral articulations in such a manner as to cause afferent nerve impulses to reflex in the spinal cord or possibly higher centers, returning by efferent pathways to cause muscular activity and hyper-irritability of an intrinsic spinal muscle or muscles. Thus, when the vertebra is pushed in such a manner as to stimulate the hyper-irritable intrinsic muscle, stretch reflex is activated and causes greater vertebral subluxation.

In the second instance, the vertebral subluxation is not the primary involvement, but rather is secondary in nature as indicated by Palmer[9] when he referred to the reflex effect of poison on the nerves resulting in spasm. Again, the intrinsic muscle or muscles of the vertebral complex will be contracted and hyper-irritable. The muscle, when stretched by a vertebral challenge, reflexly contracts because of its hyper-irritable nature, and pulls the vertebra into further subluxation. These hypotheses agree with the clinical application of the vertebral challenge, as well as with electromyographic studies of the tendency of intrinsic muscles to react to sudden force.

Skeletal muscles of the body can be either facilitated or inhibited by a vertebral subluxation. An inhibited muscle is easy to find and evaluate with manual muscle testing. A muscle which is weak on manual muscle testing specifically because of the vertebral subluxation will regain its strength immediately when the vertebra is held in a position which

statically stretches the apparently over-active intrinsic muscles, reducing the subluxation. On the other hand, when the vertebra is pushed in the direction which strengthened the associated weak muscle and then is released quickly, other previously strong muscles weaken temporarily when tested. This activity is called a "rebound challenge"; it apparently stimulates the hyper-active muscle, causing it to contract or rebound when the challenge is released. An insult to the nervous system causes temporary inhibition of muscles not associated with the vertebral subluxation. This inhibition and consequent weakness is probably due to temporary general confusion within the nervous system. The muscle not directly associated with the vertebral subluxation which weakens is called an "indicator muscle." Generally, any muscle of the body can be used as an indicator muscle regarding a vertebral subluxation. The muscle will remain inhibited from a few seconds to sometimes as long as several minutes, which agrees with the activity of the hyper-active intrinsic muscles Denslow observed on electromyography.

The muscles discussed have been the intrinsic muscles of the vertebral column, which appear to be intimately involved with the vertebral subluxation. Other muscles are also involved with the vertebral subluxation, but in a more indirect manner. Many of the muscles of the sacrospinalis, attaching directly to the vertebrae but having the opposite end of attachment on the ribs or pelvis, are very involved with structural balance of the spine. Imbalance of these muscles correlates with subluxations and will be discussed more thoroughly under "Curvatures of the Spinal Column" in Volume IV.

Muscular imbalance throughout the body can cause or perpetuate vertebral subluxations. It is easy to recognize that muscles which support and maintain pelvic balance can be responsible for stress resulting in vertebral subluxations throughout the spinal column. It is less frequently recognized that foot dysfunction, knee involvement, coordination of gait, and many other factors can have a creative or perpetuating effect on vertebral subluxations. These muscles and their activities must be evaluated and balanced for lasting spinal corrections. They will be considered with posture, gait, pelvic subluxations, neurologic disorganization, foot and knee involvement, etc., throughout this series of texts.

In summarizing the effect of the intrinsic muscles and their relation with the vertebral subluxation, it must be recognized that the normal situation is for the body to be a self-correcting, self-maintaining mechanism. In the normal body the intrinsic muscles are balanced; when stimulated by various methods, they have equal response. It is when these muscles become imbalanced regarding strength or reaction to stimuli that it is possible for a vertebral subluxation to be maintained. The normal status is for the body to correct a vertebral subluxation. Without muscular imbalance, the abnormal condition of a subluxation will probably not be maintained. (Note: this discussion of intrinsic vertebral muscle imbalance refers only to subluxations and not to vertebral fixations. A fixation is the lack of movement between two or more vertebrae, and will be discussed later.)

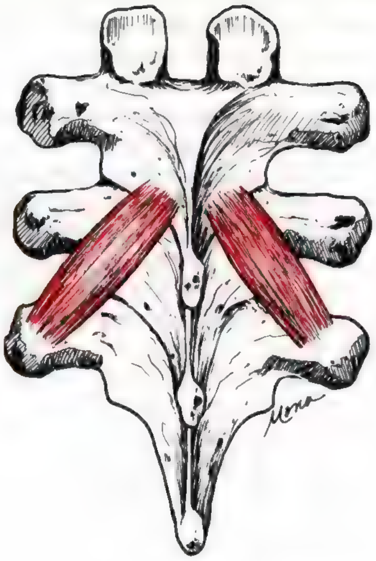
Intrinsic Muscles of the Spine

Due to the direct attachments of the intrinsic spinal muscles, any imbalance will cause direct lever action on the process and affect mobility. Many therapeutic approaches in applied kinesiology for muscle weakness or hypertonicity are applicable in restoring balance to these muscles. The general muscular involvement can be determined by finding the direction of challenge which is positive, and then reviewing anatomical attachment for muscles likely to be weak and causing a reactive hypertonicity, or muscles likely to be primarily hypertonic. Discriminate therapy localization will help pinpoint the muscle or muscles involved.

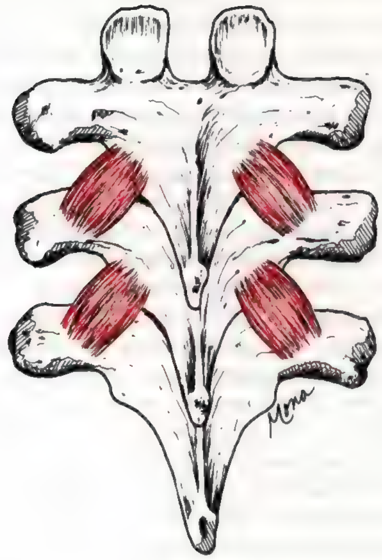
The therapeutic approaches of origin/insertion, muscle proprioceptor, fascial release, and spray and stretch techniques can be used on these muscles. (These techniques are discussed in this volume.) Because of the depth of the muscles, it is often difficult to determine precisely which type of treatment is appropriate. Generalized digital pressure in the direction of Golgi tendon organ strengthening or weakening, or muscle spindle cell therapy, is applicable and will frequently make dramatic changes. As a result of our state of limited experimental data, it might be that the therapeutic effect is of combined or different mechanisms than those perceived. For example, it is possible that even though the therapeutic effort is directed toward the proprioceptors, the actual effect may arise from origin and insertion or fascial release mechanism activities.

Rotatores Longus and Brevis

Analysis of the vertebral challenge indicates these muscles are frequently involved with vertebral subluxations. They are located along the entire spinal column from the axis to the sacrum, sometimes being absent in certain areas. They are more significantly developed in the thoracic vertebrae level. Note in the illustration (5-1, 5-2) that the rotatores brevis attach from the spinous process of the vertebra above to the transverse process of the vertebra below, while the rotatores longus attach from the spinous process to the transverse process of two vertebrae below. When the rotatores brevis of a vertebral complex are out of balance, the vertebral misalignment tends to be rotatory in nature. When the rotatores longus of a vertebral complex are out of balance, the vertebral misalignment is rotatory and tilted on the transverse plane. These misalignments can usually be seen on x-ray. Clinical impression shows that the x-ray misalignment will nearly always correlate with the evaluation procedures presented here.



5—1. *Balanced rotatores longus.*



5—2. *Balanced rotatores brevis*

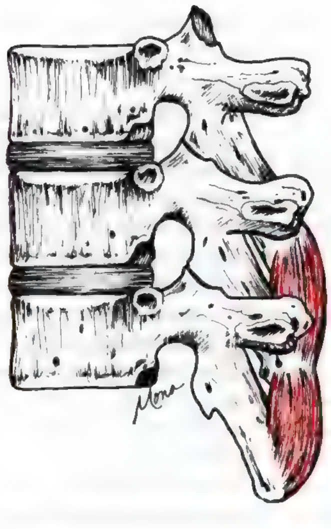
Multifidus

The multifidus is superficial to the rotatores brevis and longus. It has origin and insertion similar to the rotatores; however, it is a more continuous muscle. Its superficial fibers connect from one vertebra to the third or fourth above. The fibers next in depth run from one vertebra to the second or third above, while the deepest connect contiguous vertebrae. The multifidus contributes to subluxations in a fashion similar to the rotatores.

Interspinalis

The interspinalis muscles are a series of small paired muscles that connect the spinous processes of the vertebrae. They are more developed in the cervical and lumbar regions. Weakness of these muscles contributes to either a posterior subluxation of the vertebra of its lower attachment, or an anterior subluxation of the vertebra of its upper attachment.

Anatomical inspection would suggest that when the interspinalis is weak, there is a greater possibility of a posterior subluxation of the vertebra below when there is a thinning of the intervertebral disc because of the articular plane of the facet. When thinning of the disc develops, the superior vertebra declines down the plane of the facet, causing posteriority.[5]

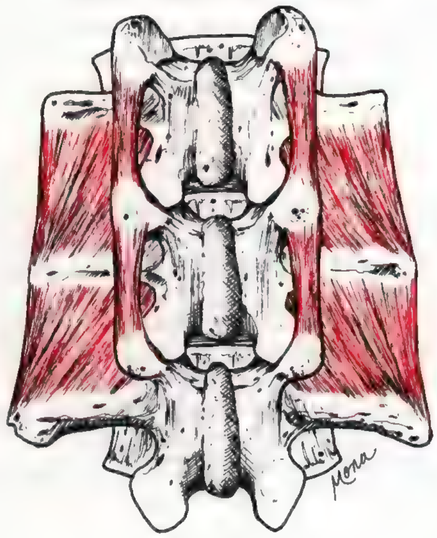


5—3. *Balanced interspinalis muscles*

5—4. *Hypertonicity of lower interspinalis muscles pulls vertebra into posterior subluxation, especially if there is a thinning of the intervertebral disc.*

Intertransversarii

The intertransversarii muscles are located between the transverse processes of the vertebrae. In the lumbar region they are significantly more developed, with fibers running between the mammillary processes as well as the transverse processes. The cervical region also has more significantly developed intertransversarii muscles than does the thoracic area. Imbalance of these muscles contributes to a lateral flexion subluxation. They are difficult muscles to influence directly with applied kinesiology treatment techniques.

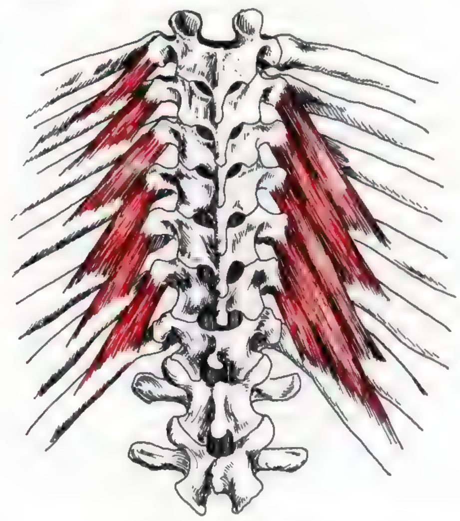


5—5. Balanced intertransversarii muscles.

Levator Costarum Brevis and Longus

Although the levator costarum brevis and longus are not considered intrinsic spinal muscles, they will be discussed here because they are considered significantly involved in anterior thoracic subluxations. They attach from the transverse process of the 7th cervical and upper eleven thoracic vertebrae and insert on the outer surface of the rib below the vertebra of origin. When weak, these muscles allow the vertebra to move up and anterior along the facet plane.

The four lower levatores costarum brevis muscles have branches at their insertions (on the ribs) which go to the transverse process of the vertebra two above. These branches of the muscles are known as the levatores costarum longus.



5—6. Balanced levatores costarum muscles. Weakness allows an anterior subluxation.

Locating a Subluxation

Several diagnostic criteria should be used to positively identify a subluxation. The combined use of three of the diagnostic criteria in applied kinesiology (palpation, therapy localization, and vertebral challenge) provides an efficient method for obtaining accurate information.

Muscle Association

There is no positive method for determining what area of the spinal column may have a subluxation affecting a specific muscle. There is a probable association between areas of the spine and specific muscular involvements. These correlate with the temporal sphenoidal diagnostic line and are listed in the accompanying chart. It must be remembered that this list is not specific; the vertebral subluxation may be in the exact area or within a few vertebrae adjacent to the area. In fact, the vertebral subluxation may be remote from the area. The chart is a guideline only.

T2 — Subscapularis
T3 — Deltoid, anterior serratus
T4 — Coracobrachialis, popliteus
T5 — Pectoralis major (clavicular division)
T6 — Latissimus dorsi
T7 — Mid trapezius
T8 — Pectoralis major (sternal division)
T9 — Sartorius, gracilis
T10 — Quadriceps
T11, 12 — Psoas
L1 — Hamstrings
L2 — Quadratus lumborum
L3 — Gluteus maximus
L4 — Tensor fascia lata
L5 — Piriformis, adductors, gluteus medius

Therapy Localization

Therapy localization can be used in two ways to locate a subluxation. First, when a muscle is weak in the clear, the

spinal column can be evaluated for a possible subluxation contributing to the muscular weakness by having the patient therapy localize along the spinal column. The muscle will strengthen if the patient therapy localizes over a vertebral subluxation associated with that weakness. It must be remembered that therapy localization tells you only that something is involved in that area, not what is involved. It is possible for an individual to have an active posterior neurolymphatic reflex or associated meridian point along the spine, which could be a factor causing the weak muscle to strengthen. This could easily be confused with a vertebral subluxation; consequently, further evaluation will be needed to differentiate a vertebral subluxation from other possible factors of involvement.

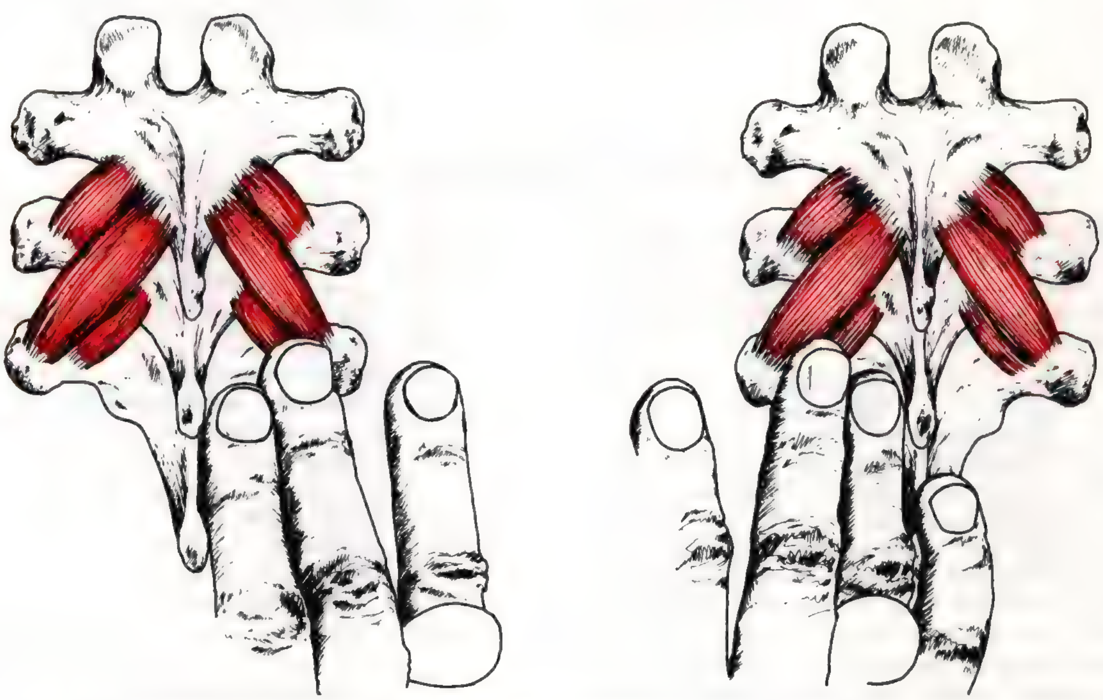
The second way to use therapy localization to locate a vertebral subluxation is to have the patient therapy localize to the suspected vertebral area, and then test a previously strong indicator muscle. In the presence of a vertebral subluxation, the previously strong muscle will weaken. Again, consider that other factors in the area — such as an active meridian associated point or posterior neurolymphatic reflex — could be the factor showing positive therapy localization.

Therapy localization using an indicator muscle can be accomplished throughout the entire length of the spine for evaluation of a subluxation, but it is a time-consuming process. It is difficult to accomplish in some areas of the thoracic spine without some modality to extend the patient's reach. There is also the potential that frequent testing of the patient's indicator muscle will cause fatigue. It is usually best to locate suspected areas in the spine with palpation, association with the symptom complex, or findings from general muscle testing of the patient.

Palpation

Consistent palpation, when done according to specific guidelines, is a very effective means of finding vertebral subluxations. This is especially easy when the examiner is knowledgeable about intrinsic muscles and their fiber alignment. The easiest way to quickly screen a spine for muscular imbalance is to palpate between the transverse and spinous processes, using two fingers which are angled across the fiber alignment of the rotatores and multifidus muscles. This can be accomplished using either hand and simply changing fingers to acquire the necessary angle across the multifidus and rotatores muscles. For this example, the right hand will be used to palpate both sides of the spine. The index and middle fingers are used to track up the spinal column on the right side between the spinous and transverse processes. The light tracking palpation will readily pick up changes in tissue elasticity associated with hypo- or hypertonic muscles. Continuing to use the right hand, the left side of the spine is evaluated by using the ring finger and the middle finger to angle across the muscles. This method of palpation will generally pick up very quickly, in a screening fashion, the areas which need further evaluation by other mechanisms.

Clinical experience shows there is a tenderness at the attachment points of muscles involved with the subluxation. For example, the anteriorly subluxated vertebra will have a very tender spinous process tip at the attachment of



5—7. Note that the alignment of the fingers is at right angles to the muscle fibers. The same hand can be used for both sides by changing fingers.

the interspinalis muscle. There will also be tenderness of the associated levator costarum, usually involved with an anterior subluxation.

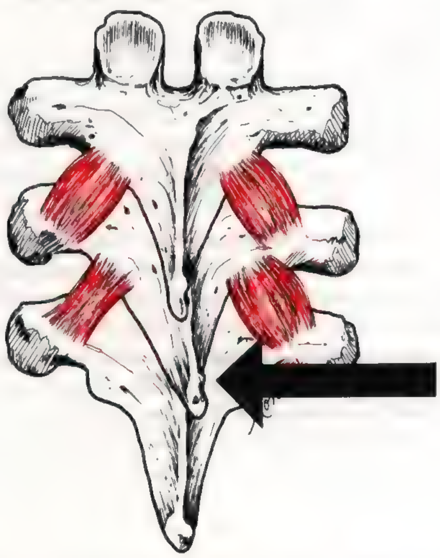
Congenital anomalies and landmark variations may lead the palpation evaluation of the spine astray. Although palpation consistently done as described is a good method of screening for subluxated areas, it must be kept in mind that the apparent muscular imbalance observed could be some other variable. Vertebral challenge (described next) clinically gives differential diagnosis of whether the palpatory indices are a subluxation or some other factor.

Vertebral Challenge

As previously mentioned, the normal spine without subluxations has balanced intrinsic muscles. Upon movement of the spine, whether active or passive, these balanced muscles return the spine and its individual segments to a condition of equilibrium without abnormal strain. It is when imbalance of the intrinsic muscles is present that a subluxation develops and is maintained.

The vertebral challenge is a passive method of testing the vertebra to determine if it will return to equilibrium. This return occurs in the normal spine when pressure is placed on the vertebra to take it out of its juxtaposition, because the muscles are balanced and react normally to return the vertebra to balance.

In the presence of a subluxation the muscles are out of balance, thus maintaining the subluxation. If a subluxated vertebra is passively pushed with a light force in a direction to decrease the subluxation and held in that position, a muscle which previously tested weak because of the subluxation will become strong as long as the vertebra is held in this position. If, however, the subluxated vertebra is lightly (one to seven kilograms of force) pushed and then released, the intrinsic muscles involved with the subluxation are stimulated and over-react, temporarily pulling the vertebra further into subluxation. When the vertebra is pulled further into subluxation by the reaction of the intrinsic muscles, there appears to be a temporary insult (approximately five to thirty seconds or longer) to the nervous system, causing previously strong remote muscles to become weaker for the duration of the hyper-reaction of the associated intrinsic spinal muscles. When evaluating for this insult to the nervous system by testing various muscles which were previously strong, the tested muscle is called an "indicator muscle."



5—8. Imbalanced rotatory brevis. Arrow points in direction of positive challenge.

To illustrate this mechanism, consider a simple rotation subluxation in the thoracic spine. In the illustration, the left rotatory brevis is weak and the right one is hypertonic. The primary muscle of involvement could be the weak muscle to which the hypertonic muscle is reacting from lack of opposition, or it could be hypertonic from neurologic or other causes.

For this illustration, a general indicator muscle which is strong before any vertebral challenging will immediately test weak when the spinous process is pushed from right to left and then released. This pressure-then-release activity stimulates the stretch reflexes of the muscles surrounding the subluxation, which in turn over-react and pull the vertebra temporarily into increased subluxation, altering neurologic activity and causing the previously strong indicator muscle to weaken. This is called a rebound challenge which evaluates for the hyper-irritable intrinsic vertebral muscles associated with the subluxation.

When doing a rebound challenge, the indicator muscle may weaken to various degrees with slightly different vectors of force; however, there will be one specific vector which will cause maximum weakening. The force may be applied to the spinous process, lamina, transverse process, or mammillary process in literally any direction the examiner can provide. When the vector producing maximum weakness is found, the optimum point of contact and vector of manipulation have been found. Analysis of this vector will also give information as to which muscle or muscles may be involved in the vertebral subluxation.

Correction of Subluxations

Evaluation of Muscles

Specific attention to the imbalanced intrinsic spinal muscles associated with the subluxation is of considerable benefit in both obtaining and maintaining correction. The following gives indication of probable muscle involvement. If the direction of positive challenge is straight lateral on the spinous process, the rotatory brevis is probably involved. For a vector of 45° lateral and superior, consider the rotatory longus. If the vector is on the spinous process in an anterior-superior direction, the interspinalis is probably

involved. Evaluate for individual, pairs, and combinations of muscles.

Therapy localization can be used to help determine which muscles are involved. Very accurate fingertip therapy localization is applied to the origin and insertion points of various muscles. When muscular involvement is located, there will be a weakening of the previously strong indicator muscle.

It is best to balance the involved muscles prior to adjusting the vertebra because this will aid in the correction. This can be accomplished by origin and insertion, proprioceptor, neurolymphatic, and other techniques described in this text. In fact, in many cases, after the muscles are balanced and the vertebra is re-evaluated for subluxation prior to adjustment, the subluxation complex is no longer present. If balancing the muscles corrects the subluxation, do not make an adjustive thrust. If the muscular balancing does not correct the subluxation, then of course an adjustment is necessary.

Adjusting Techniques

Any effective adjusting technique will work with the applied kinesiology approach to spinal evaluation and correction. The evaluation process will help the doctor find systems of manipulation which are most effective for him. There are occasions when forceful adjusting is not applicable, or may be specifically contraindicated. These, of course, include pathology, such as osteoporosis, recent trauma with soft tissue damage, the anxious patient, etc.

5—9. Use of dental hammer for correction of subluxation.

The dental "hammer" or "impactor," made popular in chiropractic manipulation as the "activator" by Lee and Fuhr,[8] has been found clinically effective in correcting subluxations, and is especially valuable when force which might to traumatizing to the patient is to be avoided. The instrument is very simple to use. The point of contact which elicited a positive challenge is contacted with the rubber tip of the instrument. The instrument is aligned in the vector which gave the optimum challenge. The percussive force of the instrument is then applied to the vertebra. Challenge and therapy localization should show a correction.

A non-force technique has been developed in applied kinesiology which is also valuable when force is contraindicated. The optimum rebound challenge is found for the subluxation. While the indicator muscle is still weak, the patient is asked to take a deep inspiration; the weakened indicator muscle is re-tested. If the weakness is immediately abolished, this is the phase of respiration which will enhance correction. If there is no change in the weakened indicator muscle, the rebound challenge is repeated and the patient expires the air out. The muscle is tested to see if it regained strength. In other words, to obtain information for the corrective procedure, it is first necessary to find the exact vector of challenge which causes a weakening of the previously strong indicator muscle, and then the phase of respiration which immediately abolishes the weakness. The corrective procedure is to press on the vertebra in the direction of positive challenge as the patient takes the phase of respiration which abolished the challenge. This is repeated six or seven times, and the patient is then re-evaluated to determine if the subluxation was corrected.

Goodheart[4] recommends not adjusting away from the plumb line, which increases the distortion. If the challenge indicates an adjustment of this nature, the patient should be positioned to curve the spine, overcorrecting for the plumb line position. The adjustment is then made in accordance with the challenge direction.

Re-evaluation After Correction

A very important part of applied kinesiology methods of evaluating the subluxation is determining when correction is actually made. Sometimes it will be found that although an adjustive thrust is made and a good, clean-sounding articular noise is elicited, the correction is not obtained. Use therapy localization, palpation, and especially vertebral challenge after every corrective attempt to make certain that the subluxation is actually corrected.

Anterior Thoracic Subluxation

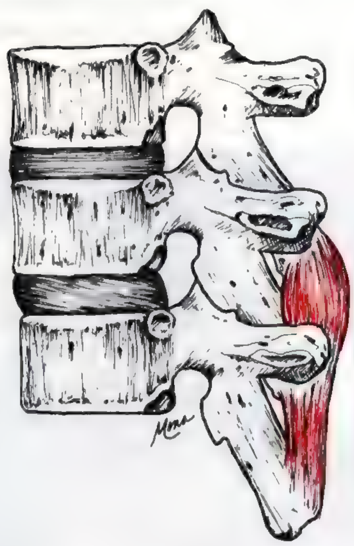
An anterior thoracic vertebral subluxation recurs often even though adequate manipulation has been done. All indications of the subluxation may be removed, but they return as soon as the patient walks or moves around. This is very important, because the anterior thoracic subluxation often correlates with intercostal neuralgia and digestive problems in the stomach or small intestines. This subluxation is muscularly correlated with the levatores costarum and interspinalis muscles. Identification of the subluxation and the associated muscular involvement is important for a lasting correction.

Diagnosis

An anterior thoracic subluxation can be located with therapy localization, although it is often difficult for the patient to therapy localize in the area of potential subluxation. If therapy localization is desired, it can be obtained using an electrical wire with a hand-held electrode on one

end and a skin electrode on the other end, as described under "Therapy Localization" (see page 26).

A significant factor of an anterior thoracic subluxation is the exquisite tenderness at the tip of the spinous process. After the tenderness is located, care must be taken to evaluate which vertebra is actually anterior. The tenderness will be present on the inferior aspect of the anterior thoracic vertebra, and also on the superior aspect of the vertebra below. This tenderness appears to correlate with the weak interspinalis muscle involved in the subluxation. It may be due to a stretch of the muscle as the vertebra flexes anteriorly into subluxation. The vertebra



5—10. Tenderness from interspinalis muscle weakness and hypertonicity present in anterior subluxation.

immediately below the subluxation may also have a spinous process with a tender inferior tip; it seems reasonable that this is due to hypertonicity of the lower interspinalis muscle which lacks opposition from the weak one above.

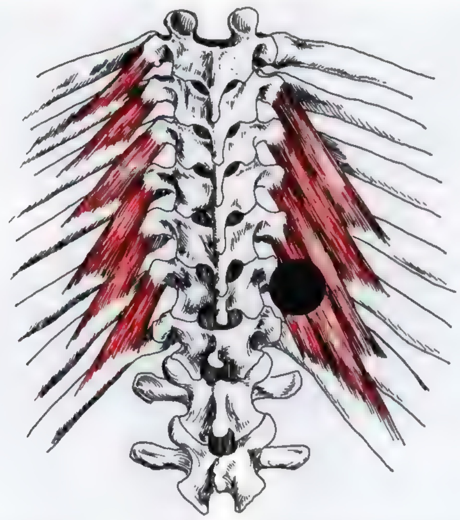
The anterior thoracic subluxation cannot be directly challenged in the usual manner. To obtain a rebound challenge, it would be necessary to press on the anterior surface of the body of the vertebra to cause a strong indicator muscle to weaken. It also seems likely that a rebound challenge would not be of value in an anterior thoracic subluxation. Therapy localization and treatment to the muscles involved, i.e., interspinalis and levator costarum, indicate that this type of subluxation is due to muscular weakness, not hypertonicity of the muscles as indicated by the electromyographic studies previously discussed. The interspinalis and levator costarum hold the vertebra posterior and inferior. Weakness of these muscles allows the vertebra to move into a flexion subluxation along the facet planes.

Muscle Involvement

Prior to manipulating an anterior thoracic vertebra, the muscles should be evaluated for weakness and, if found, treated. The muscles are nearly always involved and can be evaluated by very close, accurate therapy localization or by challenging the muscle.

The levator costarum brevis muscle arises from the transverse process of the vertebra, and inserts into the outer surface of the rib immediately below the vertebra from which it originated. The levatores costarum brevis muscles arise from the 7th cervical and the upper eleven thoracic vertebrae. The four lower levator costarum brevis muscles have branches from their insertion (on the rib) which go to the transverse process of the vertebra two above. These branches of the muscle are known as the levatores costarum longus.

To challenge the levator costarum muscle for weakness, press in a medial anterior direction on the rib immediately below, or two below, the anterior thoracic subluxation. Test a previously strong indicator muscle to



5—11. Press at dot in a medial and anterior direction for challenge.

determine if it weakens. If so, have the patient take a deep breath to see if the weakening is abolished; if not, continue testing on different phases of respiration after challenge until the weakness is abolished.

The muscle correction is obtained by pressing on the rib in the same direction which produced a positive challenge, on the phase of respiration which abolished the weakness. Repeat with four or five respirations, using four to five pounds of pressure. Re-therapy localize and/or challenge to make sure the correction is obtained. Occasionally it is necessary to repeat the procedure with an additional four or five respirations.

The interspinalis muscle should be evaluated with therapy localization and treated with origin and insertion or proprioceptive technique. The muscle can be weak or hypertonic, depending upon its location with the subluxation. If the muscle involved is from the spinous process of the subluxated vertebra to the one below, the muscle is probably weak. If it is, the muscle immediately below or immediately above the subluxation is probably hypertonic. As with other spinal subluxations, the common neurolymphatic at the junction of the 1st rib, clavicle and

sternum should be evaluated and treated if necessary.

The muscular correcting technique should always be used if muscles are involved with the subluxation, as they nearly always appear to be. Frequently, after correcting the muscular imbalance, there will no longer be indication of a subluxation and an adjustive thrust should not be used. If there is still positive therapy localization and other indications of subluxation, an adjustment should be provided. Even if the thrusting adjustment is needed, the muscular improvement will help keep the subluxation from recurring.

Correction

There are several adjusting techniques for anterior thoracic vertebrae. Nearly all are effective; two will be described here.

For the standing adjusting technique, the patient crosses his arms on his chest; the doctor places a block or pad below the anterior vertebra, holding it in place with his chest. The doctor then puts his arms around the patient and, grasping the patient's crossed arms, gives a lifting traction with anterior pressure on the blocked vertebra. This method is most effective when the patient is posterior of the lateral plumb line.[4]

The patient also places his arms across his chest for the supine adjusting technique. The doctor places his closed fist or a small block between the patient and the table on the vertebra inferior to the anteriority. He gives a light thrust on the crossed arms as the patient attempts to curl up, lifting his head and shoulders from the table. This method is most effective when the patient is anterior of the lateral plumb line.[4]

5—12. Method of adjusting standing patient with block on vertebra inferior to anteriority.

5—13. Block is placed inferior to anteriority. Doctor gives light thrust after patient flexes spine and neck.

Occipital Subluxation

An occipital subluxation may influence organization throughout the body. The head receives structural support from muscles innervated by both cranial and spinal nerves. A lack of integration of these muscles may interfere with optimum efficiency of the visual righting reflexes, tonic neck receptors, and labyrinthine reflexes. The sacrum and occiput must be well organized with each other so that the three-dimensional balance expressed as pitch, roll, and yaw functions normally. These interactions — and other important roles of occiput balance — are discussed under the individual subjects throughout these volumes.

Diagnosis

A lateral occiput is revealed during postural analysis by a lateral head tilt away from the side of occiput laterality. There is usually a leg length difference not associated with pelvic imbalance. In this instance the short leg remains short, whether in the prone or supine position, as opposed to the change that takes place when there is an atlas subluxation.

A unique factor of the lateral occiput was observed in applied kinesiology. When the tongue is extended and pointed in the direction of occiput laterality, a previously strong indicator muscle will weaken. There will be no muscle change when the tongue is extended straight out or to the side opposite laterality. The reason for this unique finding was not understood until the muscles of the hyoid and their apparent influence on body balancing was reported later in applied kinesiology clinical research. It is thought that when the tongue is extended laterally, it pulls on the hyoid by way of the hyoglossus muscle, changing the

position of the hyoid and the muscles associated with it. This stimulates the hyoid muscle proprioceptors, which apparently are intimately involved with body orientation. This subject is discussed thoroughly in Volume II under "The Stomatognathic System."

The occiput will show positive therapy localization when subluxated. Care must be taken that the therapy localization is actually revealing an occiput subluxation. There are numerous muscles, cranial sutures, stress receptors, etc., in this area which could be responsible for the positive therapy localization. An occipital subluxation can be evaluated by challenge, which is accomplished by using various vectors to find the maximum amount of muscle change from challenge. This vector is the best line of drive for correction.

Muscle Involvement

Many postural muscles may be involved with an occipital subluxation. The neck extensors and flexors can be tested as described in the muscle testing section. If found weak, they can be corrected by the usual five factors of the IVF and other treatment approaches in applied kinesiology. The intrinsic muscles are described and pictured with the atlas subluxation discussed next. They are evaluated and corrected the same as intrinsic muscles throughout the spine.

Correction

Correction of an occipital subluxation is similar to that of an occipital fixation; however, it does not require the specific stabilization of the cervical spine that a fixation correction requires. Palpate along the inferior nuchal line on the lateral occiput side to find an extremely sensitive point. This is the optimum point of contact for correction. The line of drive will be from this point to the glabella (bridge of nose). This angle should correspond with the vector found by challenge. The point is contacted with a metacarpal contact. At the time of thrust, the doctor's other hand lifts the occiput in a superior direction, allowing the occipital condyle on the side of laterality to rotate down and medially along the plane of the lateral mass of the atlas, while the opposite condyle is being lifted out of the lateral mass of the atlas. Care must be taken not to put excessive stress into the cranium, as cranial faults can be created with this manipulation.

After correction is obtained, test the Lovett Brother of the occiput, which is the sacrum. It will frequently be subluxated; if not corrected, the occipital subluxation will probably recur.

After correction of the occiput and sacrum, re-test all indices, such as therapy localization, challenge, and lateral tongue position, to determine if the correction was actually obtained.

5—14. Occipital adjustment. Note that the head is kept straight with the sagittal plane.

Upper Cervical Subluxation

Examination

The atlas and axis require very close evaluation to determine the type of subluxation present. Therapy localization reveals the presence of a subluxation; challenging in three-dimensional vectors will find the type of misalignment. The vectors of challenge should be very accurate. Occasionally both sides of the atlas will require simultaneous challenging. The atlas may be rotated, with anteriority on one side and posteriority on the other. The maximum change in muscle strength will be obtained by an anterior challenge on one side and a posterior one on the opposite side. The atlas can be totally anterior or posterior; in this case, maximum challenge reaction will be obtained by challenging both transverse processes anteriorly or posteriorly at the same time.

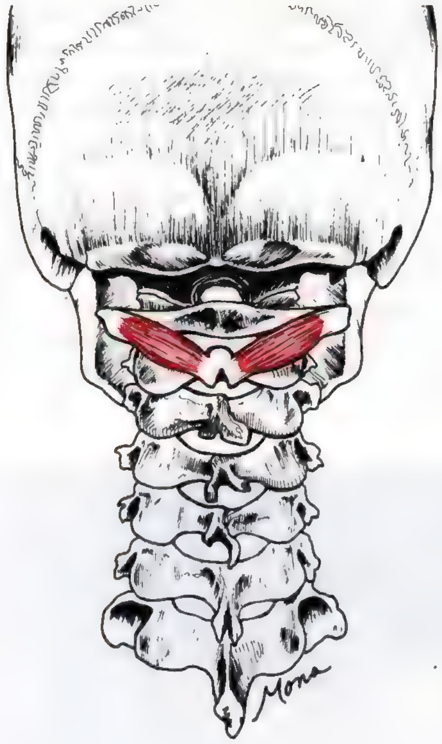
A lateral atlas has a unique relation with leg imbalance. When the patient has a short leg in a supine position which changes to a long leg in the prone position, clinical observation shows a lateral atlas is indicated. The atlas will be lateral on the side of the short leg when the patient is in a prone position. Of course, other factors should be taken into consideration, such as possible pelvic imbalance, etc. Most factors causing leg imbalance do not create a change in leg length when an individual changes position.

Muscular Involvement

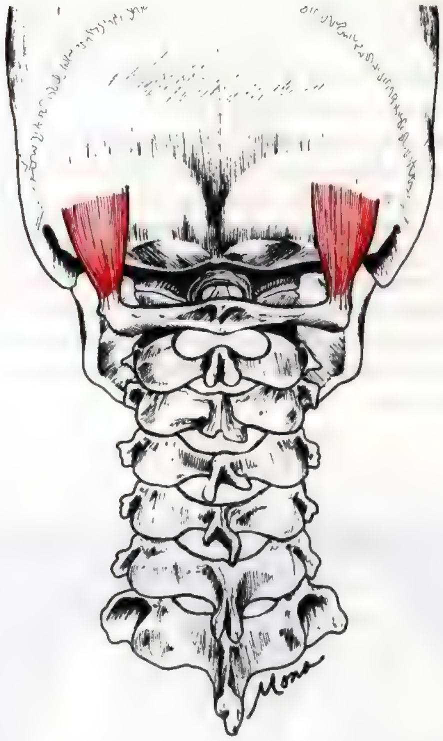
The intrinsic muscles of the upper cervical region include those between the atlas and axis and the atlas-occiput area, as well as muscles bridging from the axis to the occiput and some divisions of the sacrospinalis. These muscles are frequently involved with subluxations of the upper cervical region. Most are relatively easy to evaluate and treat with applied kinesiology techniques.

Obliquus Capitis Inferior

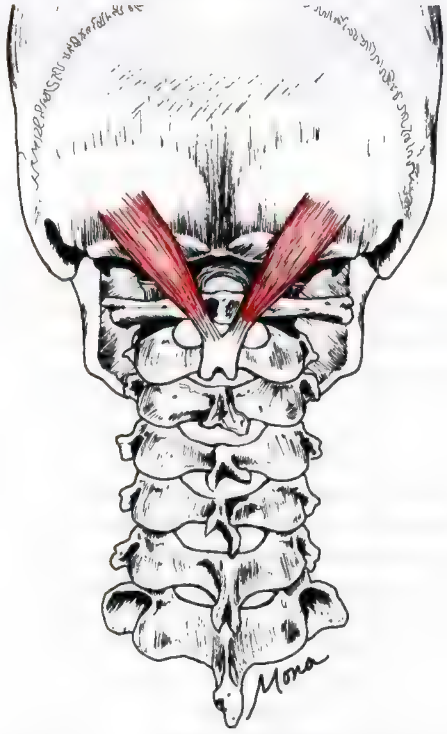
The obliquus capitis inferior does not attach to the skull, as its name would imply; rather it originates from the spinous process of the axis and inserts into the transverse process of the atlas. It is frequently involved when there is



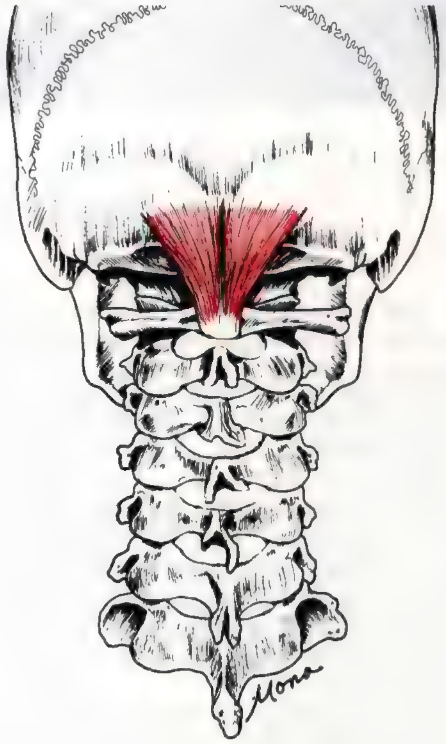
5—15. *Obliquus capitis inferior*



5—16. *Obliquus capitis superior.*



5—17. *Rectus capitis posterior major.*



5—18. *Rectus capitis posterior minor*

a rotation component between the atlas and axis in a subluxation complex.

Obliquus Capitis Superior

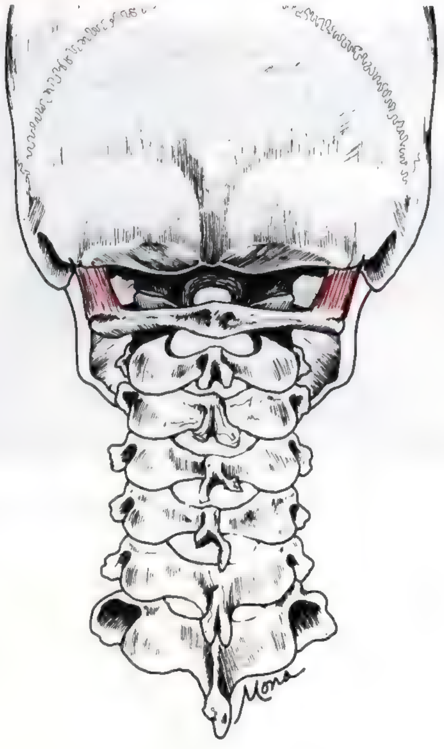
The obliquus capitis superior originates on the transverse process of the atlas and inserts on the occiput above the inferior nuchal line. It is involved with subluxations between the occiput and the atlas, whether the subluxation component is anterior-posterior, lateral, rotation, or a combination of all three.

Rectus Capitis Posterior Major

The rectus capitis posterior major muscle originates from the spine of the axis and inserts on the lateral part of the inferior nuchal line of the occiput. Because of its lateral insertion into the occiput, it is often involved when there are significant rotational components of upper cervical subluxations.

Rectus Capitis Posterior Minor

The rectus capitis posterior minor originates from the posterior tubercle of the atlas, fanning out and inserting on the occiput below the inferior nuchal line. These muscles are primarily involved when there is an anterior or posterior subluxation of the atlas with the occiput.



5—19. Rectus capitis lateralis

Rectus Capitis Lateralis and Anterior

The rectus capitis lateralis is generally an inaccessible muscle originating from the upper surface of the transverse process of the atlas and inserting on the inferior surface of the jugular process of the occiput. The *rectus capitis anterior* (not illustrated) is also inaccessible. It originates from the lateral mass of the atlas and inserts on the basilar process of the occiput in front of the foramen magnum. When involved, these inaccessible muscles must be treated by indirect stretching or contraction methods, such as the rocker motion technique for the atlas-occiput.

Correction

The methods generally used in chiropractic to correct an atlas subluxation are compatible with the applied kinesiology approach to evaluation. The most important factor for permanent correction is to evaluate and correct muscular imbalance prior to adjustment. As with other subluxations, there will often be no need to make an adjustive thrust after the muscles are balanced, because all indications of the subluxation have been removed.

One method for adjusting atlas anteriority is to make a broad contact on the skull. This is best accomplished by contacting the mastoid portion and mastoid process of the temporal bone, as well as some contact on the occiput. This broad skull contact is used to avoid creating cranial faults, which is possible with this type of corrective maneuver. The head is cradled in the hand on the lower side. The

5—20. Broad contact on skull for correction of atlas anteriority.

broad skull contact is made on the side of atlas anteriority, and the line of drive is generally through the bridge of the nose. As the correction is made, there is a slight movement of the hand in a superior direction, allowing the atlas to move in a posterior direction. The best line of drive is determined by challenging with the contact hand on the skull as if to make the adjustment.

Sacral Subluxation

Diagnosis

When there appears to be a sacral subluxation, care should be taken to differentiate it from a sacral primary respiratory fault, a category I or II pelvic involvement, or a sacral or sacroiliac fixation.

Challenge or therapy localization for a sacral subluxation is similar to that of a sacral primary respiratory fault. The main difference is the respiratory assistance to muscle weakness which, if present, indicates a sacral primary respiratory fault. Respiratory assistance means a weak muscle(s), e.g., hamstrings, becomes strong when a certain phase of respiration is held by the patient when the muscle is tested. If the sacrum is involved on this basis, the occiput requires evaluation because of its Lovett Brother arrangement with the sacrum. These conditions are discussed in Volume II.

To challenge for sacral apex anteriority, press on the inferior lateral border similar to a basic contact.

The usual approaches used to differentiate subluxations from fixations are applicable to the sacrum. This is discussed under "Fixations" in the following chapter.

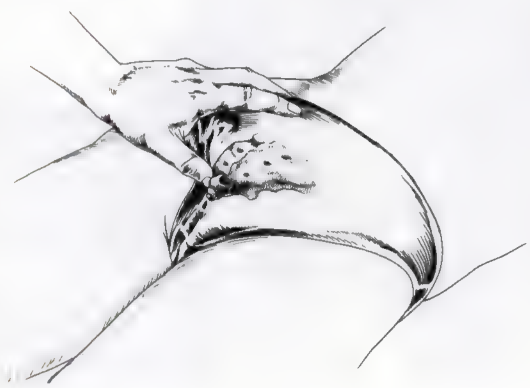
Muscle Involvement

As with other sacral involvements, the sacral subluxation is frequently associated with a piriformis muscle weakness, and sometimes with a psoas muscle weakness. The piriformis muscle gives direct stabilization to the sacrum. Frequently there will be a weak piriformis on one side, and the opposite piriformis will be hypertonic. It may be necessary to use proprioceptive or other technique on the hypertonic side to retain balance after strengthening a weak piriformis. Both the psoas and piriformis cross the sacroiliac articulation, giving stabilization. If the psoas or sacroiliac weakness responds to respiratory assistance, there is indication that the sacral involvement is of a primary respiratory nature.

Correction

A sacral subluxation can be challenged and adjusted in either a prone or side-lying position. The direction of correction is obtained by challenging with various vectors until maximum muscle change is observed. The most common type of subluxation is a posteriority, and it is adjusted most easily in the prone position.

If anterior, it can be treated with a respiratory adjustment. This is accomplished by finding the phase of respiration which abolished a positive challenge. For correction, press in the direction of challenge on this phase of respiration four or five times. It can also be adjusted similar to the method described on page 79 for an anterior sacral fixation.



5—21. Point of contact to challenge anterior sacrum.

5—22. Contacting anterior portion of sacrum for respiratory adjustment.

Lovett Brother

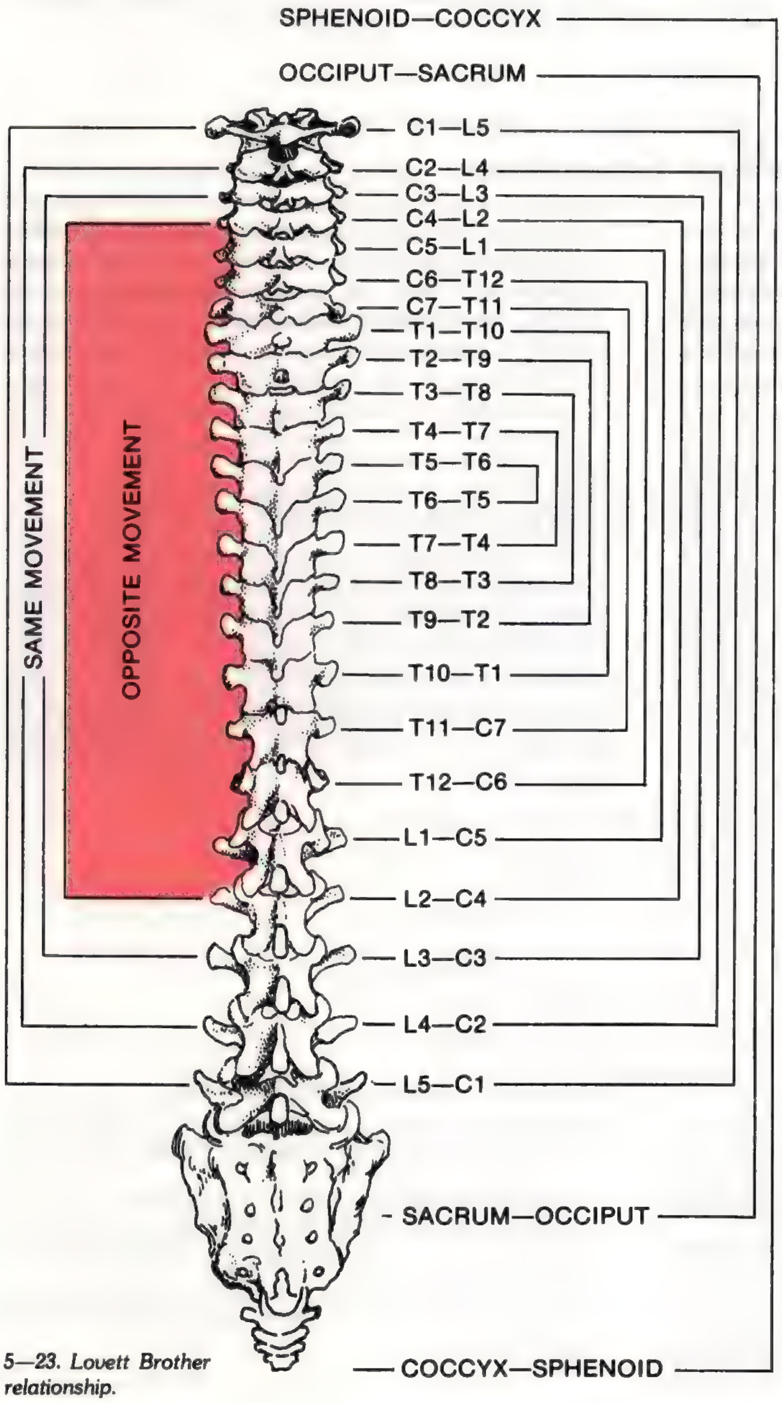
The spine appears to function with a specific harmonious movement as an individual walks, runs, and otherwise performs daily activities. The top three vertebrae of the spine may move synchronously with the bottom three; in other words, as the atlas rotates right, the 5th lumbar may do likewise. The potential of movement changes to opposite directions at the 4th cervical in conjunction with the 2nd lumbar. When the 4th cervical moves right, the 2nd lumbar moves left. This opposite movement continues throughout the spine until the upper half of the spinal column meets the lower half at the 5th and 6th thoracic vertebrae.

The vertebrae working in conjunction with each other, such as the 1st lumbar with the 5th cervical, are known as Lovett Brothers. In the early history of applied kinesiology, these were known as "half-wit" brothers. This synchronous movement extends to the occiput with the sacrum, the sphenoid with the coccyx, and the temporal bones with the innominates. Lack of the expected synchronous movement does not necessarily mean there is dysfunction. In the presence of anomalies, such as sacralization or lumbarization, the rhythm of the spine may be different. Muscular variances may also play a role, such as the psoas attaching to L5 in some cases and not in others.

Knowledge of this synchronous movement is valuable because there are often compensatory subluxations in the Lovett Brother arrangement. Often when there is a primary subluxation, the Lovett Brother will become subluxated on a secondary basis. If one of these subluxations is corrected and the other is not, the subluxation which was corrected may return. Use of therapy localization and/or challenge to the Lovett Brother of a subluxation is a good routine practice.

There will not always be a subluxation at the Lovett Brother; previous indications are sometimes eliminated by correcting a primary subluxation. Generally, the Lovett Brother will be subluxated in a manner compatible with the motion described above. If the subluxation is of the top three or bottom three vertebrae, the Lovett Brother may often be subluxated in the same direction. In other words, if there is an axis spinous right subluxation, there will possibly be a 4th lumbar spinous right (or sometimes left) subluxation. In the section of the spine from the 4th cervical to the 2nd lumbar, the subluxations are generally in opposite directions. For example, if there is a 1st lumbar spinous left subluxation, there will possibly be a 5th cervical spinous right (or sometimes left) subluxation.

Lovett Brother subluxations do not always follow the general pattern of motion of the spine, and should be adjusted in the direction indicated by a positive challenge. If the Lovett Brother subluxations do not correlate, the patient may have neurologic disorganization, which, in applied kinesiology for the sake of brevity is known as "switching." Consider this possibility and, if present, correct the neurologic disorganization prior to challenging and adjusting the vertebrae.



5—23. Lovett Brother relationship.

Dynamic Evaluation

Having the patient prone on the chiropractic table is the most common position used in evaluating for a subluxation. While most subluxations are easily observed in this position, occasionally there is one that is revealed only with specific types of activity or in a specific position. In patients with health problems that tend to defy correction, it is wise to test for a subluxation in a dynamic manner. This can be done in weight-bearing positions while the patient is seated or standing, after he runs, walks, or performs other types of physical activity correlating with exacerbation of symptoms.

Many times subluxations are secondary to other problems in the body. If they are corrected and then return immediately after the patient runs, walks, or bends over to pick up something from the floor, evaluation should be made of the feet, pelvis, gait mechanism, and other factors that could be creating structural imbalance, which in turn creates the subluxation. Clues can often be obtained from the patient by asking questions concerning the timing of symptoms. It could be after standing all day, during particular physical activities, emotional stress, etc. These factors and their relation to the vertebral subluxation are discussed in the specific conditions, such as foot, knee, gait mechanism, relative hypoadrenia, etc.

Patient Education

Knowing what a vertebral subluxation does to muscle strength can greatly enhance the patient's understanding of his health problem. As is well known in modern chiropractic, the location of a primary subluxation does not necessarily correlate with the symptoms about which the patient complains. Take, for example, the patient whose low back "slips out" when he bends over to pick up a pencil. He thinks bending over caused the involvement; the doctor knows the spine does not usually develop a problem from such simple activity. There probably was a pre-existing condition in the area, in the form of muscular imbalance or pathology. When these factors are not present, further evaluation may reveal the reason for the back "slipping out." It could be a chronic upper cervical subluxation. Questioning the patient discloses suboccipital headaches and other symptoms associated with the upper cervical subluxation. In nearly all cases of upper cervical subluxation, any indicator muscle in the body will weaken significantly when the patient turns his head into a specific position, either right or left, with or without tilting. It may require a very specific position; the doctor may need to try several to find the correct one. Although the position of the patient's head does not give accurate information for determining the direction necessary for correction, as the vertebral challenge does, it is very valuable in explaining to the patient why he has the lower back problem associated with the upper cervical subluxation. Test a strong muscle in the lower back or pelvic area associated with the patient's lower back problem. Explain to him that this particular muscle is a lower back stabilizing muscle, much like the guy wires on a telephone pole. Have him turn his head in the direction that causes weakness and re-test the muscle, showing him the lack of strength. Many times the patient will recall that as he bent to pick up the pencil, he turned his head in exactly that direction for some reason, just prior to his back "slipping out."

Vertebral challenge and its effect on muscular strength is a valuable tool in patient education and understanding of the principles by which the body maintains a state of health.

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Chapter 6

Spinal Fixations

Difference Between Subluxations and Fixations

Many in chiropractic have used the terms "subluxation" and "fixation" interchangeably, and there have been numerous definitions and descriptions of both. There is no attempt here to define either a subluxation or a fixation; there **is** an attempt to show the functional difference between the two as observed by evaluation using applied kinesiology methods.

A fixation, as we will discuss it, is a locking together of a minimum of two (usually three) vertebrae. The triple vertebrae involvement is probably due to the muscular attachment of the rotatores longus and brevis, which span a three-vertebrae complex. Listed on page 70 are the differences between a vertebral subluxation and a vertebral fixation complex.

Bilateral Muscular Weakness of Fixations

When a fixation complex is present in the spinal column, it has a specific bilateral muscular weakness. These weaknesses were observed as consistent findings by Goodheart.[2] The apparent correlation has continued to be of clinical value in locating fixations and evaluating the success of corrective attempts. The muscular weaknesses listed in the table below is always bilateral, with the exception of the neck extensors as explained in the table. Generally the fixation is of the vertebral column structures listed; however, it must be recognized that the fixation complex can be limited to only two structures or extended to more than those listed. Motion palpation is used to determine exactly which vertebrae are part of the fixation complex.

Muscle Weakness With Fixation Complex

Muscles	Interpretation
Bilateral psoas	Occiput-atlas
Bilateral gluteus maximus	C1, 2, 3
Bilateral popliteus	C4, 5, 6
Bilateral mid deltoids	C7, T1 and 2
Bilateral serratus anticus (occasionally)	C7, T1 and 2
Bilateral teres major	Any thoracic vertebral complex
Bilateral lower trapezius	T11, 12, L1
Bilateral neck extensors	Weakness when neck extensors are tested together = lumbar fixation
Neck extensors	Weakness on both sides when tested unilaterally = bilateral sacral fixation
Neck extensors	Unilateral weakness = sacroiliac fixation on side of weakness

DIFFERENCES BETWEEN SUBLUXATIONS AND FIXATIONS

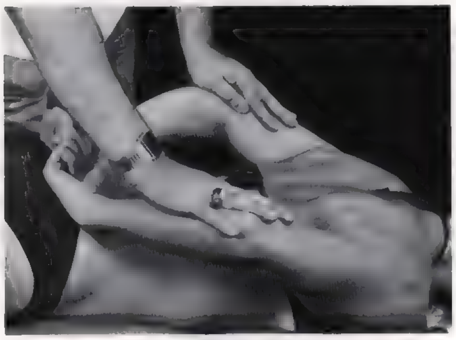
Subluxations	Fixations
Structures Involved	
One specific structure of the spinal column is involved in a subluxation. It can be a vertebra, a portion of the pelvis, or the occiput which is out of normal function with the rest of the spinal column.	In a fixation complex, there must be a minimum of two structures involved because it is predicated upon a locking between those structures. When there is a vertebral fixation, it is usually three in number; however, two or up to five (and possibly even more) vertebrae can be involved.
Muscle Weakness	
Although apparent patterns of muscle weakness may be associated with specific subluxations, they are not consistent and reproducible from patient to patient. Therefore, they should not be expected to be indicators for specific subluxations.	There are specific bilateral muscular weaknesses commonly found associated with vertebral fixations. This is discussed more thoroughly elsewhere.
Therapy Localization	
Therapy localization over a subluxation will cause a strong indicator muscle to weaken, or cause a muscle which is weak as a direct result of the subluxation to strengthen.	When therapy localizing over a vertebral fixation, there is no weakening of a previously strong indicator muscle unless motion is introduced into the fixation complex. For example, when there is an upper cervical fixation, therapy localization over the area will be positive only if the patient turns his head right and left or attempts to flex and extend the neck while the therapy localization is held. The motion does not need to continue while the previously strong indicator muscle is tested. After motion has been introduced with therapy localization, a strong indicator muscle will weaken. Therapy localization over a fixation will strengthen the bilateral muscle weakness associated with the fixation.
Challenge	
The challenge mechanism is effective with a single point of contact on the vertebra. This is applicable because there is motion available between the vertebrae, occiput, or pelvis.	In a spinal fixation, there will usually be no positive reaction to a challenge unless two vertebrae involved in the complex are challenged at the same time. For example, if there is a fixation of T6, 7, and 8, a challenge which attempts to rotate two of the vertebrae in opposite directions will cause a previously strong indicator muscle to weaken. This can be accomplished by either of the following methods: press in opposite directions on the spinous processes, or press anteriorly on the transverse processes on opposite sides of two of the vertebrae.
Static X-ray	
A subluxated vertebra is usually observable as misaligned on a static x-ray film, especially when taken in a weight-bearing position. This measurement is accomplished by various methods in chiropractic, such as millimeter measurement for rotation, wedging between vertebrae, alignment of articular processes, etc.	There is generally no observable misalignment on x-ray between fixed structures in the vertebral column. The mechanism at fault is a lack of motion between contiguous vertebrae rather than a misalignment causing apparent encroachment on the radix of the nerve.
Motion X-ray	
X-rays taken to reveal motion of the vertebrae, whether static projections taken in several positions (such as flexion, extension, and neutral views of the cervical spine) or on cineroentgenography will usually show aberrant movement of the subluxated vertebrae. This is apparently due to stimulation of the hyperactive intrinsic muscle or muscles involved with the subluxation complex.	When motion of the spinal column is observed, there will be hypokinesis of the fixation complex. This is easily seen on flexion-extension x-rays of the cervical spine when there is an upper cervical fixation.
Correction	
A subluxation can be adjusted with a single point of contact.	A fixation requires a two-handed contact, or some other method of stabilizing one of the structures while the other is being manipulated. This is required because a single hand contact only moves the entire fixed complex rather than unlocking the mechanism. Occasionally a fixation complex is unlocked with a single-hand contact; however, such results are due more to luck than calculated correction.

The weaknesses listed on page 69, when bilateral (with the exception of the neck extensors) are nearly always indicative of a fixation in the area mentioned. There is a possibility that an individual may have muscle weakness from another cause, such as bilateral involvement with a neurolymphatic reflex, neurovascular reflex, meridian involvement, etc. When a bilateral weakness is found, the individual should be evaluated with therapy localization, challenge, and possibly other factors to determine if, in fact, a fixation is present. The associated muscular weaknesses appear to be a reliable means of locating fixation complexes; however, it must be recognized that the pattern of muscular weaknesses is not pathognomonic of fixation in the vertebral column. Use other diagnostic parameters to confirm the fixation. If the fixation is not confirmed, find another cause or causes for the bilateral muscular weaknesses.

6—1. Neck extensors — group

6—2. Neck extensors — right

6—3. Middle deltoids



6—4. Teres major

6—5. Lower trapezius

6—6. Gluteus maximus

6—7. Popliteus

6—8. Psoas

Neurological Model of Bilateral Weakness

Locating the bilateral muscular weakness present with vertebral fixations is a system developed by Goodheart that has been effective on an empiric basis. The mechanism of the vertebral fixation bilateral muscular weakness was hypothesized by Schmitt.[7] He correlated the tonic neck receptors with the bilateral gluteus maximus inhibition. The tonic neck receptors have been demonstrated by many researchers[6, 1] in decerebrate animals, and in young animals whose tonic neck receptors are intact and have not yet developed efficient neck righting reflexes. The tonic neck reflexes, although developed to more efficient neck righting reflexes during progression out of infancy, remain intact in all animals, including humans.[4, 3] When the tonic neck receptors are stimulated by an extension of the head on the neck, the flexors of the hind legs or lower extremities are facilitated, while the extensors are inhibited. This action is modified and controlled in the adult by the labyrinthine reflexes. In Chapter 10 there is further discussion of the equilibrium proprioceptors and their management in applied kinesiology.

Schmitt designed an experiment to demonstrate these reflexes. An apparently normal subject is placed in the prone position. Bilateral muscles associated with fixations are tested to assure that strength is present and that the subject has no fixations. The subject is then requested to extend his head by nodding, the occiput on the atlas, atlas on axis, and axis on C3. An attempt is made to limit the extension to these structures. The subject is then requested to hold this position with significant contraction of the muscles in the upper cervical area, to the point of feeling a cramping sensation localized in that area. The gluteus maximus muscles are then tested bilaterally, one at a time; significant weakening will be observed on nearly all subjects. If the contraction is effectively located in the upper cervical area only, the popliteus muscles will still test strong bilaterally. Upon relaxing the neck, the gluteus maximus muscles immediately regain their strength.

It is hypothesized that an upper cervical fixation complex causes continuous stimulation to the tonic neck reflexes, inhibiting the gluteus maximus hip extensors. Normally, when the head is extended on the neck, there is no weakening of the gluteus maximus because the labyrinthine reflexes interact with the neck righting reflexes; this indicates there is no need to inhibit the gluteus maximus. The stimulation from a fixation complex, or experimental fixation, seems to be sufficient to override the modifying action of the labyrinthine reflexes.

This experiment cannot be performed on a small percentage of normal individuals. Generally these people are in excellent health, including structural balance and integration. This small group appears to have an above average integration of the labyrinthine reflexes with the neck righting reflexes.

This demonstration can be applied to additional fixation locations and their associated bilateral muscular weaknesses. To isolate the specific areas of fixation, it is necessary to have a subject capable of contracting muscle only in a localized area of the spine to lock specific vertebral areas. This is relatively easy when the examiner guides the patient's muscle contraction so that he extends specific areas of the spine. By palpating the areas which are not to be contracted, the examiner can give the subject feedback information to help localize the contraction.

After the subject has relaxed from the upper cervical demonstration, a similar demonstration can be applied progressively down the spine. Middle cervical fixations appear to be associated with bilateral popliteus weakness. In the previous illustration of upper cervical fixation, there was no weakness of the popliteus if the subject limited the jamming and contraction to the upper cervical area. Changing the muscle contraction to jam the middle cervical vertebrae causes bilateral popliteus muscle weakness. If the jamming is localized to the middle cervical area, the bilateral gluteus maximus muscles will be strong.

Progressing down the spine, muscle contraction to jam the lower cervical-upper thoracic vertebrae will cause bilateral deltoid muscle weakness. If the jamming is localized to this area, the popliteus muscles will be strong.

In some subjects the demonstration can be continued down into the thoracic region, which is associated with bilateral teres major weakness. Demonstrations further down into the dorsal-lumbar junction area become more difficult. This fixation is associated with bilateral lower trapezius weakness. Lumbar fixation with bilateral neck extensor weakness when tested together is easier to demonstrate.

Another method of demonstrating the association of fixations with bilateral weaknesses is to stimulate the intrinsic muscles of the spine with a low level tetanizing sine wave current. Small pad electrodes are placed paravertebrally on each side of the spine. The bilateral muscular weakness associated with the area being stimulated will usually immediately weaken, while bilateral muscles associated with other fixations will remain strong.

The bilateral sacroiliac fixation is simply called a sacral fixation. It causes weakness of the neck extensors bilaterally, but not with both sides tested at the same time. This fixation can be demonstrated by tightening a belt around the innominates, which creates a jamming of the sacroiliac articulations and simulates fixations.

Artificially stimulating specific areas with a tetanizing current, or mechanically tightening the articulations of the sacroiliac area, will affect nearly all normal subjects. However, there is still that small percentage of individuals with highly organized nervous systems which these demonstrations will not affect. It is believed that in these individuals, the organization of the proprioceptive communication to higher centers is efficient enough for recognition that there is no need for inhibition under these circumstances.

Some are of the opinion that there is a subclinical fixation in all individuals upon whom these demonstrations are effective. This is based upon the observation that manipulation to mobilize the area in question prior to the experiment eliminates the positive response. This may seem to be a non-realistic approach, because as soon as some subjects walk and move around the demonstration can be repeated effectively.

It appears that the mechanism of the bilateral muscular

weaknesses associated with fixations throughout the spine may be that of continuous stimulation of proprioceptors, which activate reflexes similar to the tonic neck reflexes. This would mean that there are proprioceptors throughout the spinal column which, when stimulated bilaterally, cause facilitation and inhibition of various bilateral muscle groups. This bilateral stimulation would equate to movements in the sagittal plane, which seems logical from the data available on reciprocal innervation mechanisms. However, the exact propriospinal pathways have yet to be demonstrated.

Fixation Evaluation and Correction

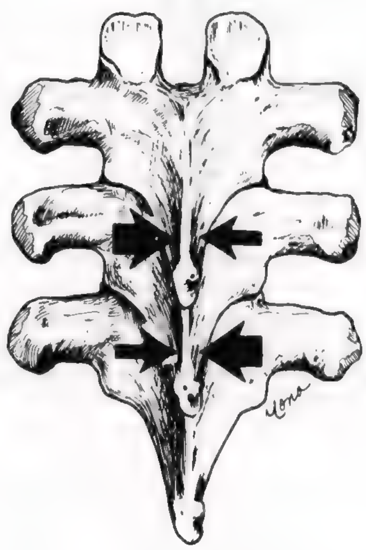
A system for evaluating and unlocking vertebrae in fixation has been developed by Goodheart[2] as an adaptation of Martindale's[5] approach to evaluating the spinal column. The original system was a complex method of motion palpation to find structures of the vertebral column which were fixated and the key motion which would unlock the fixation. Goodheart's adaptation of the system, combined with bilateral muscular weakness, simplified the procedure considerably, but it is still somewhat more complicated than some other approaches. Its advantage is that it consistently unlocks vertebral fixation complexes in a specific manner. Other more generalized approaches frequently fail to do this. General mobilization appears effective less frequently, probably due to the lack of specificity in direction of movement.

The procedure consists of three basic steps. The first step finds exactly which vertebrae are involved in the fixation complex; the second step finds in which direction the vertebral motion is limited; and, finally, the third step finds which two vertebrae of the complex are the key to restoration of mobility, if more than two are involved.

As has been noted, there must be a minimum of two vertebrae involved to constitute a fixation complex; however, there can be more, and it is not too uncommon to find five or more vertebrae in a fixation complex. With this system of unlocking the complex, two vertebrae will be adjusted. The correct manipulation of the two will unlock the entire complex, regardless of the number involved.

Step 1

To generally locate a fixation complex, test for bilateral weakness of the muscles associated with fixations. This will establish the general area of the fixation. The vertebrae involved in the fixation will usually fit the chart previously listed. Even though the fixation complex often fits the usual pattern, it is necessary to go through motion palpation to find the exact vertebrae involved. Motion is provided passively by the examiner as he observes for an unyielding or rigid feeling of two vertebrae. The best contact and pressure is usually on the lateral aspects of the spinous processes of two adjacent vertebrae, pressing in opposite directions. After evaluating for motion with this activity, reverse the contact points and evaluate for motion of the same two vertebrae in opposite directions. When a rigid, locked characteristic is observed in two vertebrae in either direction, they are part of the fixation complex. The procedure is repeated with one of the vertebrae and its adjacent vertebra, either above or below. Continue until the upper and lower limits of the fixation group are found. This is accomplished by observing a soft, yielding motion in both directions when testing two vertebrae above and below the fixation complex. Of course, sometimes the upper or lower limit is defined by reaching the occiput or the sacrum. Special techniques will be described later for these areas.



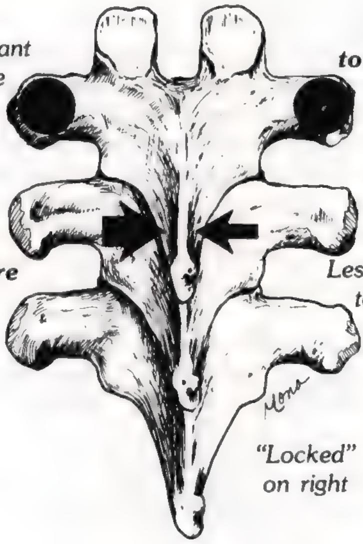
6—9. Step 1. Pressing alternately on two vertebrae in opposite directions, locate fixation complex by resistance. Evaluate large arrows together and small arrows together. Continue until freedom of motion is found in both directions with a vertebra or structure above or below. This locates top and bottom of the fixation complex.

Step 2

The fixation complex will be able to rotate easily in one direction, but will be locked in the opposite direction. The top vertebra of the complex as found in Step 1 is the key in determining the direction in which rotation is locked and which is freely moveable. This is usually accomplished by pressing the spinous process both right and left, observing the direction in which it moves easily and where it has resistance. The motion of the top vertebra can also be evaluated by pressing on the transverse processes, both right and left, and observing for resistance and motion.

Recording the observation for motion — or lack of

motion — has been confusing to many studying this procedure. In a fixation complex, the observations are for the direction in which the vertebra will not move; it can fail to move in either direction of rotation. **It has nothing to do with misalignment of the vertebra as listed in subluxation analysis.** If the right transverse process is unyielding, displaying a lack of motion, it indicates that the vertebra is locked on the right so that it cannot move anteriorly. This is listed as right posterior because it is



6—10. Step 2. Evaluate which direction vertebra can and cannot rotate. List which side is locked posterior and which is locked anterior.

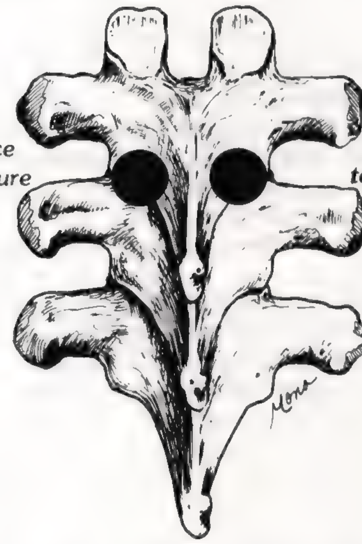
locked posteriorly. Consequently, the left side would be locked in an anterior position, unable to move posteriorly. If the examiner presses on the left side of the spinous process in a right direction and there is lack of motion, the right side of the vertebra is locked posteriorly. Since the right side of the vertebra cannot be rotated anteriorly by pressing right on the spinous process, this again indicates that the right side of the vertebra is locked posteriorly, and the left side is locked anteriorly. The vertebral fixation complex would be listed as right posterior, which means the vertebra cannot rotate to the anterior on the right. Furthermore, it would be listed as left anterior, which means it cannot rotate to the posterior on the left. Keep in mind that this listing of right posterior and left anterior has nothing to do with the vertebral position, as it would in the listing of a vertebral subluxation; it has to do with which way the vertebra can or cannot rotate.

Step 3

In Step1, the vertebrae involved in the fixation complex were located, giving top and bottom definition to the complex. In Step 2, the direction in which the fixation complex is locked was established and nomenclature was assigned. Step 3 determines which side of the fixation is primary. The combined information from Steps 1, 2, and 3 will be used to determine which two vertebrae will be adjusted.

The primary side of fixation is found by comparing bilaterally the resistance to digital pressure applied by the examiner over the facet articulations of the top two vertebrae in the complex. First, press on one articulation and then the other, making comparison. One side will feel more resistant than the other, indicating the primary side of fixation.

The illustration given in Step 2 shows the right side of the top vertebra not rotating anteriorly, indicating it was locked posteriorly, the left side being locked anteriorly. This information combines with the third step to give a final listing of the fixation complex. If resistance is felt at the right facet articulation, this indicates that the fixation is on the right; thus it would be listed as a right posterior fixation. If the resistance was found on the left, it would be listed as a left anterior fixation.



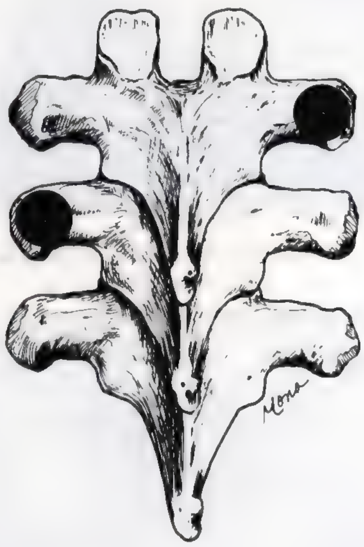
6—11. Step 3. Pressure over facet articulations of top two vertebrae will have more resistance on one side than the other. Greater resistance is found on the side of primary fixation. Combine data of side of greater resistance with direction of rotation in which the top vertebra is locked, as was determined in Step 2. In these illustrations, right posterior fixation.

At this point, a rule is applied. If the fixation is on the posterior side, the top vertebra of the complex is adjusted on the vertebra immediately below. If the fixation is an anterior one, the bottom vertebra of the complex is adjusted on the vertebra above. Whether adjusting the top vertebra on the one below or the bottom vertebra on the one above, the contact on the top or bottom vertebra is on the side of fixation. Remember, you are restoring motion, not adjusting for position as in a subluxation correction. Thus, in the example above, if the third step revealed the fixation to be on the left side, it would be a left anterior fixation and the bottom vertebra would be adjusted on the

one above. Its contact point would be on the left transverse process, lamina, or mammillary process, depending on the section of the spine in which the fixation is located. The adjacent vertebra is contacted on the opposite side.

Correction

The contact points for unlocking a fixation are the transverse processes in the thoracic spine, mammillary processes in the lumbar spine, and laminae of the cervical spine. The exception to this is the atlas; the contact point, of course, is the transverse process or lateral aspect of the posterior arch. The contact site for the top or bottom vertebra of the complex is on the side of fixation as observed in Step 3. The point of contact for the adjacent vertebra, either above or below, is on the opposite side. The adjustive thrust is of a two-step nature. The first thrust is on the top or bottom vertebra of the complex as indicated. Almost immediately following, there is a quick thrust from the opposite hand on the adjacent vertebra. Some give the first thrust on the adjacent vertebra and the second on the top or bottom. Either seems to work equally well. This quick, two-handed, two-step thrust is the most effective method of consistently unlocking a fixation on the first attempt.



Example — Right Posterior Fixation
6—12. Contact top vertebra on side of fixation and vertebra below on opposite side. Give a quick one-two type adjustment, with first movement to top vertebra.

Example — Left Anterior Fixation
6—13. Contact bottom vertebra on side of fixation and vertebra immediately above on opposite side. Give quick one-two type adjustment, first movement to bottom vertebra.

This method of unlocking vertebral fixations is extremely efficient. It has preliminary steps of evaluation requiring proficiency in the art of motion palpation, and then accuracy in the administration of the two-handed adjustive thrust.

My personal experience with this procedure dates back to around 1973. Goodheart presented the concept of bilateral muscle weakness to locate fixations and the procedure for unlocking them at a convention. I enthusiastically returned to my practice, observing keenly for bilateral muscular weaknesses. The first I found were exceptionally weak bilateral gluteus maximus muscles. With some trepidation I analyzed the upper cervical area, and attempted the two-handed corrective thrust. To my delight, both muscles strengthened to an unbelievable extent. I could almost put my entire weight on the patient's posterior leg; before the correction, the patient could scarcely lift his leg off the table. Now there was enthusiasm backed by practical experience.

The next patient who exhibited a bilateral gluteus maximus weakness was instructed by this exuberant, but naive, doctor to watch the amazing change in muscle strength about to be made. After my first corrective attempt, there was no improvement of the muscle weakness. Another corrective attempt was made, and still no improvement was evident. Finally, after several more attempts I gave up, never strengthening the gluteus maximus. The next bilateral muscular weakness also failed to respond to my attempts at unlocking the fixation, but that time I was smart enough not to tell the patient in advance what to expect! Several unsatisfactory attempts at unlocking fixations followed with different patients. At last another dramatic improvement resulted from actually unlocking a fixation. As my technical and artistic expertise in this procedure improved, my percentage of results on the first attempt improved. Now it is rare not to correct a fixation on the first attempt.

As I reflect back on this experience, I was very fortunate that my first attempt was an effective correction of the fixation complex. If, instead, I had failed consistently from the beginning, I might have taken the line of least resistance and blamed the technique for being ineffective, rather than myself. It could have been years before I again attempted the approach.

OCCIPUT FIXATION (JAMMING)

Examination

An occipital fixation is defined as one involving the occipitoatlantal articulations. Bilateral psoas weakness is frequently associated with an occipital fixation, though it can also be caused by bilateral foot involvement or other factors which must be considered. If the psoas weakness strengthens when the patient therapy localizes the occiput-atlas area, there is positive indication of its relationship with an occipital fixation. Postural balance indicating an occipital fixation or subluxation is lateral head tilt after all muscular imbalance has been corrected.

To challenge for an occiput fixation, the head is cradled in one hand, while the cervical spine (including the atlas) is stabilized with the other. A rebound-type challenge is used, moving the occiput on the atlas. Quickly test a previously strong indicator muscle for weakening. The challenge should be done in various vectors to find the most significant muscle change, indicating the best line of drive for correction. The challenge should agree with the head tilt observed during postural analysis. The occiput is lateral on the side of high occiput, and the direction of correction should be away from the high occiput side.

6—14. The atlas must be stabilized as the occiput is challenged on it for an occipital fixation.

6—15. Avoid rotation of the cervical spine and any contact with temporal bone, as cranial faults may be created.

6—16. It may be necessary for a support person to stabilize the cervical spine.

Occipital Correction

Palpate along the inferior nuchal line of the occiput on the side of contact until an extremely sensitive point is found. This is the optimum point of contact for correction. The line of drive for correction is from this point to the glabella, which is the bridge of the nose. This vector should agree with the challenge vector. A 1st metacarpal contact is made at this point; without rotating the neck, remove the slack and thrust from the point of contact directly to the glabella. In other areas of the spine, correction of a fixation requires a two-handed contact. One hand makes the adjustive thrust while the other hand stabilizes the adjacent bone. The atlas cannot be stabilized by the physician since both hands are needed to contact and stabilize the head. Care must be directed toward adequate joint locking in the cervical spine by taking out the slack. To obtain correction, it is occasionally necessary to have an assistant stabilize the cervical spine, paying close attention to the atlas. This is rarely necessary if the muscles of the cervical spine are balanced prior to corrective attempt. In fact, as with other fixations, if the muscles are balanced first, many times the fixation will be corrected and an adjustive thrust is not necessary.

Whenever an occipital adjustment is made, it should be done carefully in order to avoid creating cranial faults. Cranial faults are sometimes secondary to severe rotary-type adjustments of the occiput on the atlas. The severity of correction is eliminated by correcting muscular balance first — an important point to remember in avoiding iatrogenic problems.

UPPER CERVICAL FIXATION

Examination

The upper cervical fixation is basically analyzed and corrected in the same manner as fixations throughout the spinal column. Step 1 in evaluation for a fixation is not required on the upper portion of the fixation complex because the atlas is always the top vertebra in an upper cervical fixation complex. Motion palpation should be carried out to delineate the lower aspect of the fixation complex; it may be only the atlas and axis, or it may go down to the 4th cervical. Step 2 requires pressing on the transverse processes of the atlas to determine in which direction of rotation the complex is locked. Step 3 to determine the side of fixation is accomplished by pressing over the facet articulations between the atlas and axis.

Correction

Correction of the fixation complex can be done in the prone position, the same as other fixations throughout the spine. After the doctor has made contact for correction, it is good to have the patient lift his head and neck slightly into the resisting pressure of the doctor's contact just prior to the adjustive thrust. This activates the patient's neck extensors which, if balanced, appear to aid in the correction.

6—17. Just prior to the doctor's adjustive thrust, the patient extends upper cervical spine into doctor's hands.

6—18. Contact for supine upper cervical adjustment.

Although more difficult for most doctors, the cervical fixation can also be unlocked with the patient in the supine position. The same rule applies — if there is a posterior fixation, the axis is held while the atlas is adjusted upon it; if the fixation is anterior, the vertebra immediately above the inferior vertebra of the complex is held, while the inferior vertebra is adjusted on the one immediately above it.

SACRAL FIXATION

Description

In applied kinesiology, the sacrum is considered fixated when there is bilateral sacroiliac fixation. There will be a specific side toward which correction will be directed. The type of correction is determined by use of motion evaluation similar to that in the rest of the spine.

Examination

Bilateral muscle weakness for identification is different for sacral fixations than for vertebral fixations throughout the spine. The fixation is revealed by individual (right and left) neck extensor weakness, though the muscles are strong when tested simultaneously. As will be seen later, this is the same muscular identification that is used for the sacroiliac fixation, except that for the sacral fixation the muscles are weak on each side when tested individually. This individual pattern of weakness is an indicator only, and is not pathognomonic. If the weakness is abolished by therapy localization to the sacroiliac articulations, it correlates with a possible sacral fixation. Further differential diagnosis must be made. The sacral fixation, like others, will not therapy localize as observed by a general indicator muscle unless the therapy localization is held while attempting to introduce motion into the articulations.

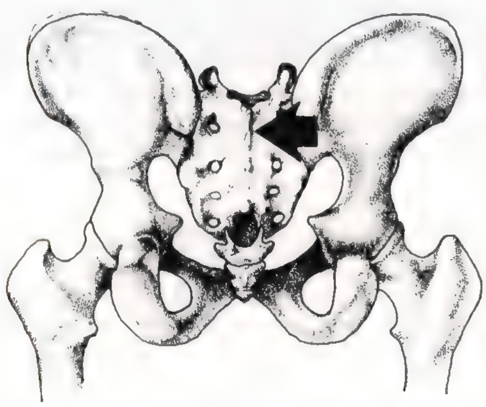
It will not challenge unless a two-handed challenge is done, with one hand on the ilium and the other on the sacrum, or there is some other method of stabilizing the innominates. When using this as a differential diagnosis, testing for a subluxation, care must be taken not to stabilize the innominate. In a prone position, the sacrum can usually be challenged for fixation without a second hand on

the ilium because the table stabilizes the innominate bones, giving the same effect as a two-handed challenge.

The piriformis and psoas are involved with a sacral fixation. The piriformis is a stabilizing muscle to the sacrum; it is nearly always hypertonic and usually bilateral in the presence of a sacral fixation. The psoas will often be hypertonic, and may be so bilaterally. Sometimes a hypertonic piriformis will be found on one side, and a hypertonic psoas on the other. The hypertonicity appears to be a causative factor for the presence of a sacral fixation. Attention should be given to these muscles for correction of the hypertonicity. Schmitt[8] pointed out that the fascial release technique applied to the hypertonic muscle often eliminates indication of a fixation without manipulation. Since his observation, the spray and stretch technique has been applied to these muscles in the presence of fixation, with clinical results. These techniques are described in Chapter 11.

If adjustment is necessary for the sacral fixation, an examination similar to that used in vertebral fixations provides information for easy correction. Since the fixation is already defined as being between the sacrum and the two innominate bones, the first step in ordinary fixation analysis — locating the exact structures involved — is unnecessary.

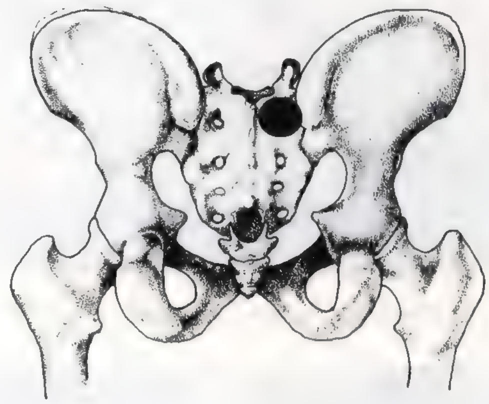
Step one: contact the tubercles on the sacral crest and attempt to move the sacrum both right and left. It will be observed that the sacrum will be felt to move in one direction; there will be resistance to movement in the opposite direction. If the sacral tubercle moves easily



6—19. Step 1. Press both right and left on sacral tubercle; determine movement and resistance. Tubercle moves more easily to side of anterior fixation, and there is resistance to side of posterior fixation.

toward the left, the sacrum is fixed anterior on the left and posterior on the right because the sacrum can apparently move into fixation easier than out of it. If the sacral tubercle moves easier to the right, the sacrum is fixed anterior on the right and posterior on the left.

Step two: the sacrum is adjusted on the ilium on the side of major fixation. Find this side by observing for the greatest amount of resistance to an anterior testing pressure directed over the sacrum, just medial to the posterior superior iliac spine with the patient in a prone position. If resistance is found on the posterior side, it is considered a posterior fixation; if on the anterior side, it is an anterior fixation.



6—20. Press at the location of the dot, first on one side and then the other; determine which has the greater resistance. This is the side of major fixation. Combine this information with that from Step 1 to delineate posterior or anterior fixation.

Remember in fixation analysis that the posterior and anterior delineation is in reference to which way the structure is locked, not its actual position. An anterior designation means that side of the sacrum can move more easily anteriorly than it can posteriorly. The structure can move more easily into lesion than out of it. In fact, this is why there is a fixation; the structure cannot move easily in both directions. Consequently, when the structure can easily move anteriorly, it needs to be forcefully brought posterior; when a structure can easily move posteriorly, it needs to be forcefully taken anterior.

Posterior Fixation Correction

If the resistance in the second step is found on the

6—21. Contact for right posterior sacral fixation adjustment.

posterior fixation side (sacrum moves posterior easily on that side), adjust the sacrum anteriorly with the patient in a prone position. Contact the sacrum medial to the posterior superior iliac spine, and adjust in an anterior lateral vector along the plane of the sacroiliac articulation. The ilium is stabilized by contact with the table, allowing a one-hand contact (6—21).

6—22. Doctor's right hand is stabilizing posterior side of fixation next to table, while the sacrum is brought posterior on anterior fixation side by torque through the spinal column.

Anterior Fixation Correction

If the resistance in step two is found on the anterior fixation side (sacrum easily moves anteriorly on this side), correction is more easily obtained with the patient in a side-lying position. The anterior fixation side of the sacrum is up, away from the table. The patient's leg close to the table is straight, while the other is flexed at the hip and knee, with the toe tucked behind the knee of the straight leg. The doctor stabilizes the posterior sacrum and the patient's flexed leg and pelvis, while the shoulder away from the table is rotated posteriorly. This places a torque through the spinal column to the sacrum, moving the anterior fixation side of the sacrum posterior. The key to easily obtaining this correction is good stabilization of the opposite side of the sacrum, and of the pelvis and leg on the side of sacral anterior fixation. If the muscles were corrected first and adequate stabilization is maintained, only a slight amount of rotation through the spinal column is needed; thus iatrogenic problems are not created in the lumbar spine or some other area from the torque.

After correction of a sacral fixation, re-test the patient for improved neck extensor muscle function. Correction of only one side of the sacrum unlocks the entire mechanism, and the neck extensors on both sides should test strong (6—22).

SACROILIAC FIXATIONS

Examination

A sacroiliac fixation is indicated by unilateral neck extensor weakness. Differential diagnosis, to determine if the sacroiliac is the cause of the weakness, can be obtained by having the patient therapy localize to the sacroiliac, and then checking to see if the neck extensor weakness is abolished. If positive, the sacroiliac is associated with the neck extensor weakness; still, a fixation is not specifically indicated. Differential diagnosis now entails determining whether the sacroiliac involvement is a category II subluxation, or a fixation. The category II will have the indices described in the next chapter under that title, whereas the fixation will not.

In the presence of a fixation, there will generally be a hypertonic psoas or piriformis. Hypertonicity of the muscles bridging the sacroiliac tightens and locks the articulation. Attention should be given to these muscles to bring them back to normal balance. Hypertonicity will often be secondary to a weak psoas or piriformis on the opposite side. If the muscles are hypertonic on a primary basis, applied kinesiology treatment for hypertonicity should be used. Correction of the muscular imbalance often eliminates the need to physically adjust a sacroiliac fixation.

Correction

Evaluation to determine how to correct the fixation is relatively simple compared to fixations in other areas of the spinal column. Generally the correction requires separating the sacrum and the ilium. A relatively quick challenge, in which the examiner directs a vector of force and then holds it while a muscle is tested to determine change, can be used to determine precisely what line of drive is best for correction. Usually this challenge can be accomplished with one hand, even though that breaks the rule of two-handed challenge for fixations. The reason is that the pelvis typically has enough weight and stability for the sacrum to be stabilized while the examiner directs his vector of challenge into the posterior superior iliac spine. As the examiner holds the challenge, the neck extensors are tested for strengthening. When the best vector for correction is found, the neck extensors will be at their maximum strength. Also, a previously strong indicator muscle can be tested to determine weakening.

Although the pelvis has significant stability, it is best to stabilize the sacrum with one hand while the posterior superior iliac spine is manipulated for correction. Again, re-test the neck extensors to determine if correction has been obtained.

The same principle of octacosanol used for weight-bearing fixations applies to sacral and sacroiliac fixations, as well as to the rest of the spinal column. This subject is discussed on page 81 and is important in recurring conditions.

FIXATION MASKING PATTERNS

There will sometimes be clinical evidence of a fixation; however, the bilateral muscular weakness associated with it is not found on testing. Schmitt[9] observed patterns where, after one fixation was corrected, another appeared. He developed a hypothesis for this clinical finding which consists of two fixations being present although only one reveals itself with the usual associated bilateral muscle weakness. Apparently, the bilateral muscle weakness of one fixation can cause the bilateral muscles associated with another to be strong by an interplay between the muscle groups. After the first fixation is corrected, the second one is revealed by the usual associated bilateral muscle weakness.

These combined patterns of fixations are related by agonist-antagonist activity of their bilateral muscle association. If one fixation has exceptionally weak muscles, the antagonist muscles apparently become facilitated, thus testing strong until the first fixation has been corrected. Its correction eliminates the interplay between the two sets of muscles, and the muscles associated with the second fixation test weak. The hypertonicity or contraction of an antagonist muscle to one which is weak as tested by manual muscle testing has been observed on a routine basis in applied kinesiology. The exact mechanism is not known; it appears to be similar to the reciprocal innervation reflex.

Dorsal-Lumbar and Cervical-Dorsal Fixations

The dorsal-lumbar fixation is associated with bilateral lower trapezius weakness, while the cervical-dorsal fixation is associated with bilateral deltoid weakness. When the arm is abducted to a 90° position for deltoid testing, the scapula rotates to begin facing the glenoid cavity superior. This places the scapula in such a position that the origin of the posterior and middle fibers of the deltoid is somewhat in alignment with the fibers of the lower trapezius, which insert on the spine of the scapula. This positioning appears to put the muscles in an agonist-antagonist relationship in reference to moving the scapula. Apparently the weakness of the lower trapezius from the dorsal-lumbar fixation causes a facilitation of the deltoid. Clinically it has been observed that when the dorsal-lumbar fixation is corrected, the cervical-dorsal fixation may be revealed by bilateral deltoid weakness, which was not previously present. Note that ordinarily in humeral abduction, the lower trapezius and deltoid are synergistic. It is only when the humerus is in the 90° abduction position for testing purposes that the fibers come close to an alignment giving the possibility of antagonistic function in movement of the scapula.

Upper Cervical-Occipital Fixation

A similar interaction appears to be present between the upper cervical and occiput fixation patterns. The upper cervical fixation is associated with bilateral gluteus maximus weakness, while the occiput fixation is with bilateral psoas weakness. The gluteus maximus extends the pelvis on the femur, while the psoas flexes the pelvis on the femur.

It appears possible to have both an upper cervical and an occiput fixation, yet only one complex is observed by muscle testing. If the gluteus maximus muscles test bilaterally weak, there is a possibility of the psoas muscles testing strong as a result of the described interplay. Correcting the upper cervical fixation returns the gluteus maximus muscles to normal. The psoas may now appear weak, indicating the possibility of an occiput fixation. The reverse also appears to be true. An occiput fixation indicated by weak psoas bilaterally can mask weak bilateral gluteus maximus muscles. It is good clinical practice to determine if one of these fixation complexes appears after the other has been corrected.

Fixations Masking Subluxations

Occasionally, after a fixation has been corrected, vertebral challenge, therapy localization, and other methods of testing will reveal a subluxation in the area where a fixation has been corrected. The subluxation may not appear until a few minutes after the fixation has been corrected, or until the patient has moved around, walked, etc.

Weak Muscles	Mask This Weakness
Bilateral lower trapezius	Bilateral deltoid
Bilateral gluteus maximus	Bilateral psoas
Bilateral psoas	Bilateral gluteus maximus
Bilateral lower trapezius	Bilateral pectoralis major (clavicular division)

Fixations may mask subluxations.

Bilateral Pectoralis Major (Clavicular Division) Weakness

In applied kinesiology, bilateral pectoralis major (clavicular division) weakness appears to indicate dysfunction of the cranial primary respiratory mechanism. This muscle weakness is also frequently observed in hypochlorhydria.

Occasionally a patient will have all indications of hypochlorhydria, with the exception of the bilateral pectoralis major (clavicular division) weakness. The lower trapezius is antagonist to the pectoralis major and may influence the apparent strength of the pectoralis major (clavicular division). These patients will frequently have a dorsal-lumbar fixation. After the fixation is corrected and the bilateral lower trapezius has regained normal strength, the pectoralis major (clavicular division) will test weak. Apparently a similar mechanism to that described above is influencing the pectoralis major (clavicular division), as has been discussed.

WEIGHT BEARING FIXATIONS

Examination

Some fixations are not revealed until the patient is in a weight-bearing position. These can easily be evaluated by testing the patient for the bilateral muscular weaknesses in a standing or a sitting position. When a bilateral muscle weakness develops in a weight-bearing position, the examiner should have the patient therapy localize the suspected fixation area to determine if the weakness is eliminated. This provides a differential diagnosis, eliminating other possible causes of a weight-bearing weakness, such as pelvic or foot dysfunction.

Another method of observing for a weight-bearing fixation is to artificially put weight into the spinal column as if the individual were standing. This can be accomplished for the upper cervical and upper thoracic regions by having the patient press toward the feet on top of his own head. Prior to applying the pressure, have the patient touch the top of his head and test to determine if there is positive therapy localization. If so, correct whatever is therapy localizing. This prevents obtaining a false positive when testing for a gravity fixation.

In the pelvic, lumbar, or lower thoracic area, the patient can press against the footrest with his feet on certain types of chiropractic tables. It is better to use the standing position for weight-bearing information, as the simulated weight bearing — although convenient — does not have the spine in its normal weight-bearing position.

Correction

A nutritional factor has been claimed for fixations which is especially important in weight-bearing fixations. This is octacosanol, found in wheat germ oil. When a fixation having this correlation is present, it will appear when the patient is in a weight-bearing position. Sometimes a fixation, corrected in the prone position, returns when the patient stands. Chewing wheat germ oil with octacosanol will immediately eliminate indication of the fixation. Generally a dosage of three pearls of wheat germ oil with octacosanol per day is adequate to eliminate this problem.

6—23. Weight-bearing test of gluteus maximus evaluating for upper cervical fixation.

Octacosanol is often indicated when there are numerous fixations throughout the spine and pelvis. When this is observed, it is good practice to evaluate the individual in a weight-bearing position to determine if some or all of the fixations return. Octacosanol will generally eliminate the fixations in a weight-bearing position.

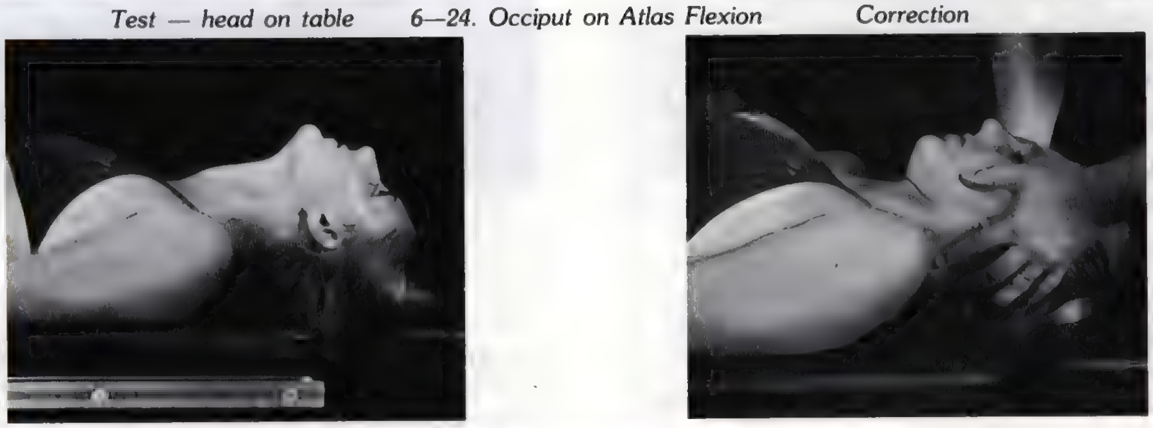
Flexion and Extension — Atlas and Occiput

When there is disturbance of flexion or extension between the atlas and occiput, it is known as "rocker motion" involvement. Generally, disturbances of this nature can be corrected with the usual evaluation and correction procedures for the upper cervical region and the occiput. Occasionally, however, a disturbance of the cervical spine remains which does not yield to the usual approaches. This is probably because of involvement of the anterior muscles of the spine and occiput, which are inaccessible to the usual modes of treatment. If, after releasing fixations and correcting subluxations and balancing the accessible muscles, there is still a problem in the cervical spine, the flexion and extension aspects should be considered. Rocker motion is evaluated by testing the patient in various aspects of flexion and extension; correction is done either passively or actively on the patient's part.

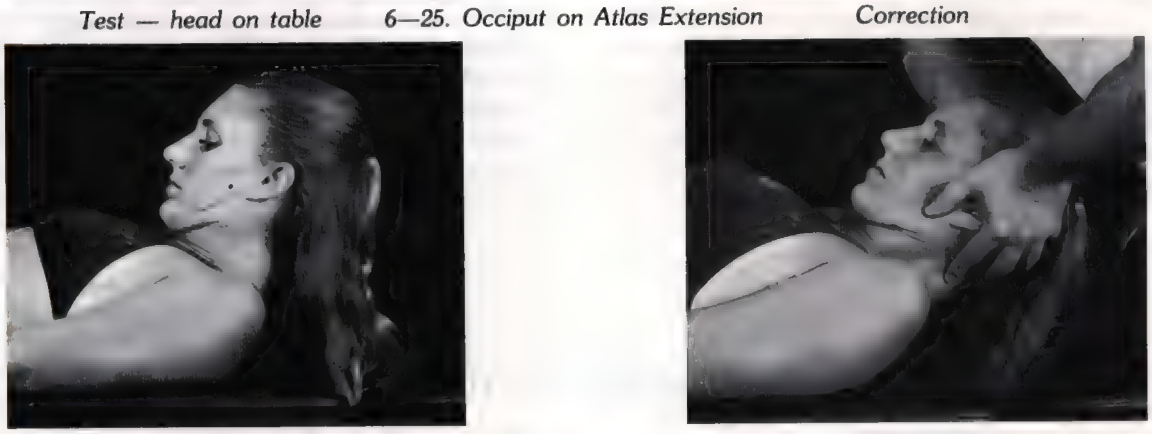
Occiput on Atlas Flexion

The patient flexes the cervical spine, beginning with the occiput on the atlas and continuing until maximum flexion is reached, keeping the posterior aspect of the cranium in contact with the examination table. The position is one where the patient attempts to touch his chin on his chest but is prevented from doing so by keeping his head on the examination table. While the patient holds this position, a previously strong indicator muscle is tested for weakening. If the test is positive, the doctor makes the correction by stabilizing the patient's head, grasping the temporal and occipital areas bilaterally, while the patient attempts to recreate the testing position. The doctor resists the motion so the patient is in a maximum isometric contraction. The procedure is repeated three or four times. Re-test to determine if correction is obtained.

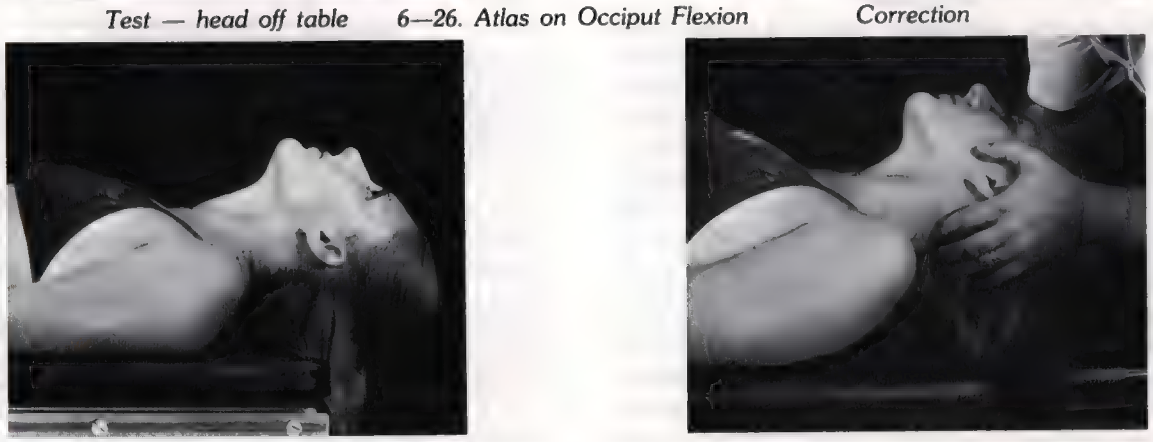
Test — head on table *6—24. Occiput on Atlas Flexion* *Correction*



Test — head on table *6—25. Occiput on Atlas Extension* *Correction*



Test — head off table *6—26. Atlas on Occiput Flexion* *Correction*



Test — head off table *6—27. Atlas on Occiput Extension* *Correction*

Occiput on Atlas Extension

The patient extends his neck, beginning with the occiput on the atlas and continuing until maximum extension is obtained, his head on the examination table. The patient holds this maximum extension, and a previously strong indicator muscle is tested for weakening. If positive, the correction is accomplished in a manner opposite that of occiput on atlas flexion. The patient returns his head to the neutral position. The examiner stabilizes the head while the patient attempts to put his head and neck into extension. The examiner applies pressure counter to the patient's effort, so that the patient is making a maximum isometric contraction. Repeat three or four times, and re-test to determine if correction is obtained.

Atlas on Occiput Flexion

The testing procedure is similar to that of occiput on atlas, except that the patient flexes his neck to the maximum amount, lifting his head off the table, touching the chin to the chest. While this position is held, a previously strong indicator muscle is tested for weakening. If positive, the doctor obtains correction by passively stretching the patient's head and neck into maximum flexion while the patient relaxes. This is a passive action done by the doctor, not by the patient. Repeat three or four times, then re-test to determine if correction is obtained.

Atlas on Occiput Extension

The supine patient extends his neck and head to the maximum amount while holding his head off the examination table. Holding this position, a previously strong indicator muscle is tested for weakening. If positive, the doctor obtains correction by passively stretching the neck and head to maximum extension. Again, this is a manual activity by the doctor, not the patient. Repeat three or four times and re-test to determine if correction is obtained.

It is rare for more than one of the four possible types of rocker motion involvement to be present. The correction is a lasting one, and should not need repeating. If the involvement returns, additional factors — such as gait mechanism, foot, pelvis, etc. — should be evaluated to determine the cause of the secondary stress in this region.

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Chapter 7

Pelvis

Normal pelvic function is essential for normal body function. Many times when pelvic dysfunction is the basic underlying cause of a patient's health problem, there will be no symptomatic complaint in the pelvic area. The symptoms could be headaches, neck pain, visual disturbance, pain at the 1st rib head, or shoulder outlet syndromes affecting the shoulder or arms. The problem could be in the lower extremity, such as knee pain or foot dysfunction, or it could be in an organ or gland. The list could go on and on because of the fundamental nature of pelvic dysfunction affecting the entire body.

DeJarnette[3] developed the category system of classifying pelvic involvements. His system of evaluation and correction is a viable one which correlates well with applied kinesiology analysis and correction. There are several methods of correcting the involvements found. Some may fit an individual's therapeutic dexterity better than others. Several methods will be discussed here, primarily those most commonly used in applied kinesiology. These methods were modified, usually by Goodheart, from various others, including DeJarnette's.

Pelvic involvements are listed in three divisions: categories I, II, and III. The category I is a twisting of the pelvis without osseous misalignment at the sacroiliac articulations; thus there are no subluxations as such in this involvement. The category II is an osseous misalignment, constituting subluxations at one, or possibly both, sacroiliac articulations. The category II can be expanded to include a possible subluxation at the symphysis pubis. Category III is an intact pelvis which has anterior or posterior tilting, causing subluxations in the lumbar spine.

Applied kinesiology has a modified approach to the evaluation of the category system to determine the type of involvement, as well as the muscles involved with the dysfunction. Because of the muscle-organ/gland association used in applied kinesiology, additional diagnostic capability is available to help determine the basic underlying cause of the pelvic dysfunction, which often is not initially due to structural stress.

To differentiate the three categories of pelvic dysfunction, it is necessary to know the characteristics of each. It is impossible to accurately evaluate for a single category without making differential diagnosis from other categories. DeJarnette has an entire system for evaluation and correction of the categories. Mentioned in this text will be only his plumb line analysis and analysis of movement of the 1st rib. The blocking technique for categories I and II of sacro occipital technique is also discussed. Sacro occipital technique has much to offer, and its study is recommended.

In applied kinesiology, various diagnostic tools such as therapy localization, challenge, muscular strength, leg length, etc., are used to give a definitive diagnosis between the categories. There is significant value in understanding the muscles and organs associated with the category problems. The involvement of the pelvis can be primary, causing health problems throughout the body, or it can be secondary as a result of organ dysfunction and subsequent muscular imbalance. Permanent correction of the category is difficult — or impossible — until the organ is returned to normal, and muscular balance is obtained.

Category I Pelvic Fault

The pelvic torque pattern in a category I involvement is often related to other rotation patterns in the body. The association can be with primary cranial respiration, as well as rotation throughout the spine, thorax, and shoulder girdle — in fact, throughout the body. As with other pelvic involvements, permanent correction of a category I pelvic fault is dependent upon correction of other faults which may be present and in harmony with the category I. Sometimes correcting the category I will result in correction of other involvements without specific attention being given to them. On the other hand, correction of the category I may be immediately lost when the patient, stands, walks, or otherwise moves. This is because other dysfunctioning areas are solidly established, causing the

category I to return to be in harmony with the uncorrected faults. Primary cranial respiration function is frequently involved with the category I pelvic fault, probably more so than any other aspect other than the muscles associated with the pelvis itself.

Examination

Static postural analysis is generally one of the first diagnostic approaches used in an applied kinesiology examination. Sacro occipital technique[3] offers two evaluation methods that can be used in this position. First, the patient will have a forward and backward pelvic sway (AP-PA) as he stands at the plumb line. Care should be taken that there is not a foot subluxation or some other factor causing the normal stretch reflex of body balance to be exaggerated, giving this indication.

Second, the examiner places his thumbs into the upper trapezius musculature over the posterior aspect of the 1st rib head. The patient is then requested to flex his neck and head all the way forward, and then to extend them all the way back. In a category I, there will be motion of the 1st rib head on both sides.

The category I can be further evaluated in the supine or prone position. The prone position is more convenient because several muscular correlations, and finally treatment, are done in this position.

Therapy Localization

The prone patient places his right hand over the right sacroiliac articulation, and his left hand over the left sacroiliac articulation. Careful placement of the fingers over the articulations is important. Sometimes a difference of half an inch in finger placement will make a difference in positive or negative therapy localization. In the presence of a category I, two-handed therapy localization (one on each sacroiliac) will be positive, causing a previously strong indicator muscle to weaken. There will be one sacroiliac which is the compromised, or positive, side. This side will show positive therapy localization with two hands, one placed over the other. The double-hand contact provides a more powerful therapy localization, and will always show the compromised side. In a category I, both sacroiliacs will not therapy localize individually. If this type of therapy localization is present, consider the possibility of bilateral category II or some other problem. Remember, therapy localization only tells **where** — not **what** — a problem is. To get good differentiation between a category I and a category II, all aspects must be considered.

7—1. First step in therapy localization for category I. Positive therapy localization with one hand on each sacroiliac indicates probable category I.

7—2. Positive therapy localization with two hands placed over one sacroiliac indicates positive or compromised side of category I. May also show positive therapy localization with only one hand.

Positive therapy localization with one hand on each sacroiliac can also occur in the rare presence of a bilateral category II. In this instance, there will be a bilateral posterior ilium or bilateral posterior ischium, or one of each on either side. When bilateral therapy localization is positive, but there is no appropriate challenge, muscle involvement, or primary cranial respiration correlation, evaluate thoroughly for a possible bilateral category II.

Challenge

The torque pattern of a category I will correlate with the leg length analysis used in chiropractic. The ilium will be posterior on the short leg side, and the ischium will be posterior on the long leg side. The only exception appears to be when there is an anatomical short leg, which is uncommon.

A category I will show a positive challenge when the posterior ilium side is challenged toward the anterior by pressing on the posterior superior iliac spine; the posterior ischium side is simultaneously pressed anteriorly at the ischium or acetabulum. A category I will not usually challenge when only one sacroiliac is challenged. This characteristic can be used for differential diagnosis. If only one sacroiliac articulation is challenged for differential diagnosis, care must be taken that the challenge is limited to only that articulation. This is accomplished by stabilizing the sacrum with one hand and challenging either the posterior superior iliac spine or the posterior ischium. If the sacrum is not stabilized and challenge is administered to either side, it may be transmitted to the opposite sacroiliac

because of anterior pressure on the opposite innominate by the table pad. For example, if pressure is applied to the posterior superior iliac spine on one side, the force would go through the sacroiliac to the sacrum and finally to the opposite sacroiliac; thus the innominate would be stabilized by the table pad on the anterior superior iliac spine. In this instance, there is actually a challenge being given to both sacroiliacs, even though direct pressure is applied only to one.

A positive challenge of a category I occurs when the bilateral challenge is administered on a rebound basis, and a previously strong indicator muscle weakens. The category I pelvic fault, like nearly all involvements of the body, is usually on a three-dimensional basis. This can be observed when the challenge is positive by varying the vector of challenge until the one is found which causes the greatest weakening of the indicator muscle. This vector is best for correction of the fault.

Muscular Involvement

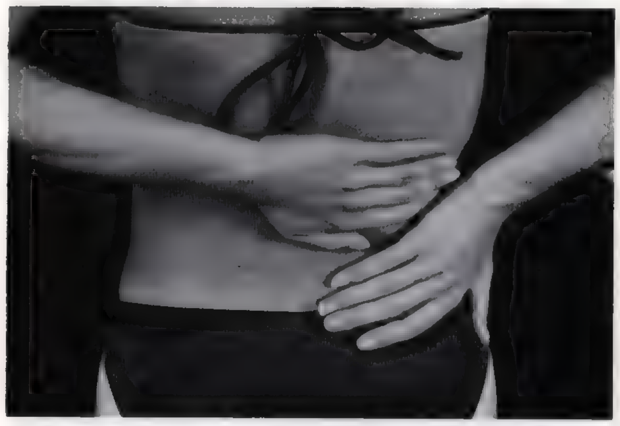
A weak piriformis is often associated with a category I pelvic fault. The piriformis weakness, along with that of the gluteus maximus discussed later, correlates with DeJarnette's dollar sign[3] in sacro occipital technique. The piriformis can be tested in the clear, with heel tension, or in a weight bearing position. The weight bearing procedure is best and is accomplished by putting the patient on his hands and knees and testing the piriformis. The procedure can also be done with the patient on his knees in an upright position; however, stabilization is difficult.

7—3. Weight-bearing test for piriformis.

The heel tension test is a modification of DeJarnette's testing procedure. Having the patient dorsiflex his foot, thus creating tension on the Achilles tendon, will frequently weaken the piriformis and/or hamstring muscles. The weak piriformis will usually be found on the compromised side of the category I.

When the piriformis is weak on either side with any of the above tests, it should be evaluated for all factors of the IVF and treated appropriately. Usually evaluating and treating the piriformis is adequate for the muscular aspect of a category I pelvic fault. If a weak piriformis is not found, or if the correction of a category I is not maintained, additional muscles should be evaluated.

Test the gluteus medius, gluteus maximus, sacrospinalis and quadratus lumborum. These should be evaluated in the clear or in a weight-bearing position. The sacrospinalis and quadratus lumborum can be tested by individual muscle tests presented by Beardall,[1] or by indirect testing originally used in applied kinesiology by Goodheart.[5] The indirect test for the quadratus lumborum and sacrospinalis is done with therapy localization. The patient, in a weight bearing or prone position, places one hand over the quadratus lumborum; the other hand is placed immediately above on the sacrospinalis. The hands are not superimposed over one another; rather, each hand contacts the skin over the respective muscle. While the patient holds



7—4. Therapy localization to sacrospinalis and quadratus lumborum.

this therapy localization, the previously strong neck extensors or other indicator muscles are tested for weakening. If therapy localization is positive, the usual applied kinesiology methods are used to strengthen the muscles. Weakness of the sacrospinalis and quadratus lumborum equates with DeJarnette's crest sign in sacro occipital technique.

If the piriformis, gluteus maximus, or gluteus medius is involved, vitamin E supplementation should be considered. If the sacrospinalis is weak, the nutritional supplementations to be tested for are vitamins A, C, and P.

Cranial Fault Correction

The cranial primary respiratory mechanism is very closely related to a category I pelvic fault. This interrelation is associated with the dural attachment and synchronous movements of the cranium with the pelvis. In the early days of applied kinesiology, the cranial primary respiratory mechanism was not always considered involved with a category I pelvic fault. By using very accurate

vectors of challenge for cranial faults, it is observed that there is often compensatory cranial involvement with a category I. (The cranial association is discussed more thoroughly, as is the category I pelvic fault, in Volume II of this series.) If cranial faults are present, a category I correction will often be lost. It is important that attention be given to the stomatognathic system, which has been thoroughly covered by many authors[6, 18, 16] in applied kinesiology, and is the primary subject of Volume II.

First Rib and Shoulder Outlet Syndrome

A shoulder girdle distortion is often secondary to this pelvic fault. The torque is compensatory to the pelvic torque. There will nearly always be tenderness at the articulations of the 1st rib head and clavicle with the sternum. The stress will often manifest as subluxations of those articulations. Tenderness on digital pressure will usually be exquisite, but will be dramatically relieved upon correction of the category I.

A shoulder outlet syndrome affecting the neurovascular bundle will often be associated with this involvement. The syndrome can be observed by standard orthopedic testing as a scalenus anticus syndrome, costoclavicular syndrome, pectoralis minor syndrome, or other neurovascular bundle compression. These orthopedic tests are described by Cailliet[2] and others. An interesting observation is that correction of the category I and secondary findings often produces a reduction in positive orthopedic tests and patient symptoms indicating the shoulder outlet syndrome.

If, after correcting the category I, there is still some involvement of the shoulder girdle, a procedure described by Powell[14] is of value. With the patient in a supine position, a DeJarnette block is placed behind the lower cervical vertebra. Pressure is applied to the distal ends of the clavicles in a posterior direction.

The articulations of the shoulder girdle can be therapy localized and challenged and, if positive, manipulated for correction. (This is discussed more thoroughly in the shoulder section of Volume IV of this series.)

Correction

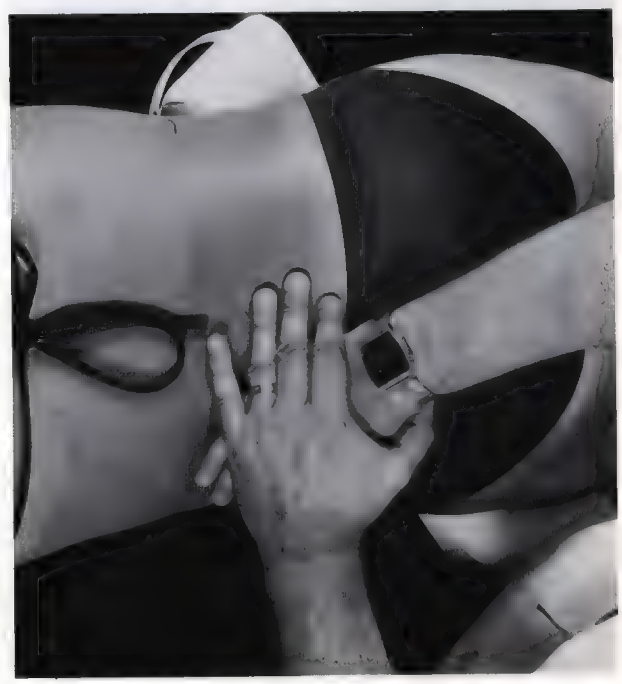
The usual correction for a category I in applied kinesiology is a modified version of DeJarnette's sacro occipital technique. The system uses the block wedges, with the patient in the supine position.

Block Adjusting Technique

The type of pelvic torque must be determined for placement of the DeJarnette blocks. Indication of the pelvis position can generally be determined by observing the apparent leg length difference. When supine, the posterior ilium side is usually the short leg side, and the posterior ischium side the long leg. This will also be the case when prone, except when a lateral atlas causes a functional leg length difference when changing from a supine to a prone position. As mentioned, there could be a true anatomical short leg; however, this is uncommon. The posterior ilium and ischium sides should be confirmed by challenge.

The DeJarnette blocks are placed under the anterior superior iliac crest on the posterior ischium side, and under the acetabulum and femoral head on the posterior ilium side. This is believed to cause a torque about the upper axis of the sacroiliac rotation as a result of the pressure exerted by body weight. Although the DeJarnette blocks are best, rolled up towels or the patient's shoes can

7—5. Blocks placed for category I left PI ilium and right posterior ischium. Blocks are placed under anterior superior iliac spine and acetabulum and point toward each other.



7—6. The manipulation is a pumping-type movement opposite the positive side. Illustration is for category I positive on right, with a posterior ilium on side of manipulation.

be used in an emergency.

The position of the blocks can be confirmed by having the patient re-therapy localize to determine if the positive reaction has been removed. Interestingly enough, the positive reaction will often be removed regardless of which way the pelvis is blocked; however, if the pelvis is blocked incorrectly, the positive therapy localization will return after approximately thirty seconds. If therapy localization is used for confirmation of the blocking position, allow a period of time to determine if positive therapy localization returns.

As mentioned earlier, one sacroiliac is the compromised or involved side, and the other side is non-involved. The compromised side is revealed by two-handed therapy localization; it will occasionally show with one-handed therapy localization. The non-involved side will not therapy localize. Correction is obtained by first blocking the patient, and then administering a light, repetitive pumping-type thrust on the non-compromised (non-involved) side. If the block on the non-involved side is under the anterior superior iliac spine, the adjustive movement is to the ischium. If under the acetabulum, then contact the posterior superior iliac spine. The adjustive thrust is never over the block because, obviously, there is no place for the structure to go. The adjustive thrust is into the normal side to transmit the energy through the innominate, sacroiliac, sacrum, and, finally, to the involved sacroiliac.

It bears repeating that **the corrective motion is applied to the non-involved side.** Corrective motion is a light, pumping-type action repeated approximately ten times. An excellent indicator for the number of repetitions is reduction of tenderness at the junction of the 1st rib and clavicle with the sternum. Palpate this area for tenderness prior to placing the DeJarnette blocks, then compare after the blocks are in place. Usually the placement will considerably reduce the tenderness; after the therapeutic movement is applied, the tenderness will be reduced even more. The percentage of pain reduction will often be very high. A good indicator is to obtain a minimum of 50% pain reduction, nearly always achievable.

Re-evaluation After Category I Correction

The significant reduction or removal of pain at the articulations of the 1st rib head and clavicle with the sternum is a good index for correction of the category I. Positive therapy localization and challenge should also be abolished. If the muscles involved with the category I were corrected prior to blocking and administering the light repetitive adjustive thrust, the correction will be easier to obtain.

Correction of a category I should be permanent. If the category I returns after the patient stands, walks, or moves about, some other factor remains to be corrected. After correcting the condition, it is good to have the patient walk around the examining room or — in problem cases — even go outside and walk around a block or two; then re-evaluate for return of the category I. If it does return, further evaluation should be done to determine the reason. Obviously, a correction that does not hold until the patient gets to his car is of no significant value in health improvement.

The category I pelvic fault correlates very closely with the cranial primary respiratory mechanism. The stomatognathic system should be thoroughly evaluated if a category I involvement returns. Other functional disturbances which may contribute to its return are improper gait function, lack of cloacal synchronization, foot dysfunction, and imbalance in the positions of pitch, roll, and yaw (PRY technique). Chronic organ or gland involvement can also cause the muscles to weaken again, allowing the category I to return. Chronic bladder involvement may affect the sacrospinalis, and reproductive problems may affect the gluteus maximus, minimus, and medius.

Sequential examination in different positions and during activities can help isolate the cause of a recurrent category I. It is not uncommon to have the patient test negative in the prone position and positive in a weight-bearing position. This is easily evaluated by having the patient therapy localize while standing on the platform of a hi-lo table. The pelvis can also be challenged in this position. If the finding is positive in this position, but not when the patient is prone, the feet are probably contributing to the condition.

7—7. Standing against a hi-lo table gives good stability for muscle testing while therapy localizing for a category I in a weight-bearing position. The neck extensors or piriformis could also be tested.

When testing to find a contributing factor causing the return of a category I, test only one additional factor at a time. To avoid introducing other factors — such as PRY, gait, cloacal synchronization — into the weight-bearing test, do not allow the patient to turn his head or move his body, other than for therapy localization after going from a prone to a standing position. If this test is negative, have the patient walk around the room. Upon approaching the hi-lo table or test position, he begins therapy localizing with a hand on each sacroiliac. Test the neck extensor muscles for possible weakening. If there is a positive finding here,

evaluate for involvement of the gait mechanism, cloacal synchronization, feet, or a need for PRY technique.

It must be emphasized that correction of the category I is absolutely necessary for the patient's optimum health. A category I pelvic fault contributes to much structural disturbance throughout the body, ultimately affecting the chemical and mental sides of the triad of health. If the patient's category I pelvic fault returns, evaluation should continue until the basic underlying cause is found and corrected.

Category II Pelvic Fault[7]

Description

The category II pelvic fault is an osseous subluxation of the sacroiliac articulation. There has been considerable controversy regarding movement of the sacroiliac articulation and the possibility of it becoming subluxated. This controversy has continued, even though there have been significant clinical results from manipulation of this articulation dating back to the "bone setters." Some, such as Steindler,[15] have discussed the sacroiliac articulation having "no visible motion." He goes on to state, "Considering the strong reinforcements which this junction receives from the massive sacroiliac ligamentous apparatus, one understands that pelvic fractures are seen more often than actual sacroiliac separations."

An orthopedic surgeon, presenting expert testimony at a trial, was heard to give an impassioned discussion regarding the great strength and lack of motion of the sacroiliac articulation. In making reference to the massive ligaments of the articulation, he stated that it is possible to have a structural derangement of the sacrum with the ilium, but only in the case of a "screaming" accident over a cliff, or some such thing. He went on, explaining that the leg would be driven up into the pelvis, and the tremendous force could cause derangement of the articulation, but there would be multiple fractures if the trauma were adequate to cause that type of problem.

A more moderate orthopedic viewpoint comes from Tureck,[17] where he states, "'Sacroiliac subluxation' implies that ligamentous stretching has been sufficient to permit the ilium to slip on the sacrum." He goes on to state, "The displacement is so slight it cannot be recognized in roentgenograms . . . the pain of subluxation is often relieved dramatically and suddenly by manipulation."

Mennell[13] gives a more liberal orthopedic view, stating, "Many people still doggedly hold to the belief that there is no movement in the sacroiliac joints, except in pregnant women. This belief perpetuates the greatest folly in all teaching on back problems."

Illi[10] presents the chiropractic viewpoint from his research on the sacroiliac articulation by dissection and x-ray. He concluded that there is significant movement in the sacroiliac.

A recent study by Frigerio et al.[4] gives conclusive evidence of significant movement of the sacroiliac articulations. An adaptation of stereo-radiography was used to project two beams onto two plates, with the beams and plates located orthogonally to one another. The *in vivo* movement of the iliac crest relative to the sacrum ranged up to 26 mm, with torsional [*sic*] and flexing movements. The innominates were found to move not only relative to the sacrum, but to simultaneously pivot about the symphysis pubis. This significant motion is the reason for leg imbalance and the other postural distortions observed in a category II involvement.

The category II is usually unilateral; however, it can be bilateral, making it slightly more difficult to distinguish from a category I. Occasionally the symphysis pubis will also be in subluxation. The category II is differentiated from the category I by therapy localization, challenge, and specific muscular involvements correlating with unique pain or tenderness patterns which must match the pelvic position and muscular weaknesses. When making the differential diagnosis between a category I and a category II, observe all the signs listed with the various types of involvement. If all factors do not correlate, something is missing in the diagnosis; evaluation should continue until the examination fits a specific pattern. When evaluating for a category II, if all signs are not present, consider the possibility of a category I or a sacral fault. The therapeutic approach differs for a category I and a category II; results are not adequate if the corrective attempt is made for the wrong category.

Category II subluxations are almost always three-dimensional in character. In the past, more emphasis has been given to the posterior ilium and posterior ischium positions; however, much better results will be obtained if the misalignment is looked upon as three-dimensional and all factors are considered.

The muscular involvement present with different types of subluxations is of primary importance in evaluating for a category II. The body is a self-correcting, self-maintaining mechanism; if possible, it will correct its own subluxations. A pelvic subluxation seems capable of existing only when the muscles cannot return the pelvis to balanced function. If this is the case, then obviously the muscles responsible for returning the subluxation to normal are involved. They may be weak or out of balance with their antagonists. Evaluating the muscles and balancing them is of primary importance in obtaining permanent correction of a category II.

It is the applied kinesiology view that lack of attention to muscle balance is the cause for most recurrent sacroiliac problems. The patient may be efficiently adjusted and get temporary relief, only to have the condition return at a later time. This constitutes treating the symptoms and not the basic underlying cause of the problem. Correcting the muscles may require attention to the associated organ or gland, as the muscle dysfunction may be secondary.

The muscular factor in a subluxation can be illustrated by correcting a posterior ilium (or other involvement), giving no attention to the muscle weakness. Have the patient walk around the room, and re-test for the presence of a posterior ilium. In most cases you will find that it has returned. After correcting the muscular weakness, the same sacroiliac correction can be made and its integrity will be maintained after the patient walks.

A category II is often secondary to some other health problem. In the presence of an adrenal insufficiency, there will usually be a weakness of the sartorius and gracilis muscles, making them incapable of providing anterior stabilization to the pelvis; thus very slight trauma or routine daily activity will cause a sacroiliac subluxation of a PI ilium variety. In this case, having the patient chew appropriate nutrition to enhance adrenal function will often strengthen the sartorius and gracilis, which will then correct the subluxation and remove positive therapy localization and challenge, return leg balance, etc. This experiment can be reversed by having the patient chew a substance detrimental to the adrenal, such as refined sugar; the pain pattern, therapy localization, challenge, and leg imbalance will usually return.

Prior to correcting any sacroiliac subluxation, the muscles involved should be corrected. This will often correct the subluxation. The patient should walk; if the subluxation does not return, no adjustment should be administered. If the subluxation does return or was not corrected by balancing the muscles, the adjustment should be made.

This discussion will be of the different types of misalignments that occur with a category II. When each type is understood, the examiner can combine the information to evaluate the pelvis in the three-dimensional manner in which it works and in which dysfunction takes place.

Plumb Line Analysis

The sacro occipital plumb line analysis for determining an individual's pelvic category II will usually correlate with applied kinesiology evaluation. The plumb line analysis is the same for all divisions of the category II. The patient will have a lateral sway, which will not necessarily be coincidental with respiration, of approximately one-quarter inch. When the doctor's thumbs are placed into the upper trapezius over the 1st rib head, there will be motion of only one rib as the patient flexes his neck and head forward, then extends them all the way back.

Since the plumb line technique evaluates the patient's sway, either laterally or from anterior to posterior and back, it is probable that the stretch reflex is integrated into the evaluation. It appears that the stretch reflex can be influenced by foot subluxations. The muscles primarily influenced on anterior to posterior and posterior to anterior movement are the soleus and anterior tibial. The hip adductors and abductors influence lateral sway. It is clinically observed in applied kinesiology that subluxations of the foot can influence the balance of any of these muscles, especially when in a weight-bearing position. Consideration for foot, knee, and other subluxations which may influence the swaying pattern should be given.

POSTERIOR ILIUM

Description

The posterior superior iliac spine has moved posterior and inferior, causing the innominate to be in a position where the ilium is posterior and the ischium is anterior. This does not consider any rotation of the innominate in the transverse plane.

Therapy Localization

A strong indicator muscle goes weak when the hand is placed over the sacroiliac of the involved side. If there is bilateral category II involvement, each side will therapy localize individually, and both will therapy localize together, one hand on each side.

Challenge

A previously strong indicator muscle will weaken when the posterior superior iliac spine is pressed with a rebound challenge in an anterior and slightly superior direction. Immediately after the challenging thrust, the strong indicator muscle will weaken and remain so for five or more seconds. If a challenge is used as a differential diagnosis for a category II from a category I, care should be taken that the challenge force goes only into the sacroiliac being evaluated (see category I challenge, page 86).

Muscle Involvement

The posterior ilium's presence usually comes from failure of the sartorius and gracilis muscles to give anterior support to the pelvis on that side. One or both of these muscles will usually be weak; if not found in the clear, therapy localization to the five factors of the IVF will usually detect the weakness, or test in a weight-bearing position, etc.

The knee is frequently involved in the category II posterior ilium because of the role of the sartorius and gracilis in providing medial knee stabilization. There may be a knee subluxation which needs to be adjusted for permanent correction of the sacroiliac. The gait mechanism, as well as the foot, should also be evaluated.

Tenderness[7, 8]

There will be tenderness at the origin of the sartorius at the anterior superior iliac spine and the upper half of the iliac notch, as well as at the muscle's insertion, which is the upper part of the medial surface of the tibia near the anterior border. Tenderness will be at the origin of the gracilis, which is the lower half of the symphysis pubis and medial margin of the inferior ramus of the pubic arch, and at its insertion at the upper part of the medial surface of the tibia distal to the condyle. There is also usually tenderness along the lower 1/3 of the gracilis and sartorius at the medial aspect of the thigh.

On digital pressure, there is usually tenderness at the

7—8. *The pelvis is provided anterior support by the sartorius and gracilis. Tenderness in a posterior ilium category II will be at the circled locations.*

articulations of the 1st rib head with the sternum, and at the attachment of the rib at the first thoracic vertebra.

Postural X-ray

The innominate will be longer on the posterior ilium side if the x-ray is taken weight-bearing and with properly aligned equipment. It will usually also show in non-weight-bearing x-rays if the patient is lying flat on the table.

Leg Length

The leg on the side of the posterior ilium will appear to be short when the patient is supine.

Postural Evaluation

When the patient is placed in the Adam's position, there will be an elevation of the ilium on the posterior side.

Correction

Correction of a posterior ilium can be made in a side-lying, prone, or supine position. The side-lying position is that taught in the Gonstead technique and by others. The shoulder is stabilized with the involved side up, the hip and knee flexed, and the toes tucked behind the knee of the extremity next to the table. The contact is on the posterior superior iliac spine, with the line of drive for the thrust indicated by the challenge.

When adjusting the posterior ilium in the prone position, it is most easily accomplished when the table has a drop mechanism, such as that of a Thompson terminal point table. This technique allows very accurate vectors of correction, and it does not place unwanted force into the lumbar spine.

7—9. *Patient lifting pelvis for placement of second block to correct left posterior ilium.*

7—10. *Position of blocks for correction of category II left posterior ilium.*

Generally when the muscles have been corrected prior to adjusting, there is little difficulty in easily obtaining corrections. Occasionally a sacroiliac will be resistant to manipulation. The leg on the side of involvement can be used to gain additional leverage in these cases. The patient is placed in a prone position; the doctor makes contact with the posterior superior iliac spine as usual, and with the other hand lifts the thigh away from the table. As the adjustive thrust is placed into the posterior superior iliac spine, the leg is lifted, giving a posterior movement to the lower portion of the innominate.

The standard DeJarnette method of block placement[3] is for the supine patient to flex his knee and hip on the side of the PI ilium, placing the foot on the table to lift the pelvis from the table. When adequate elevation of the pelvis is available, the block is placed at a right angle to the body, half under the posterior superior iliac spine, and half under the posterior abdominal musculature. The second block is placed on the non-involved side under the acetabulum and ischium, with the patient's leg again lifting the pelvis. It is placed at a 45° angle to the patient, with the narrow wedge in, angling superior. It can easily be seen that this blocking position uses the patient's rotation as he lifts his pelvis and body weight to obtain correction of the pelvis.

Another non-traumatic use of the DeJarnette blocks is with the patient supine, one block underneath the posterior ilium and another under the ischium on the opposite side. The long leg is flexed and brought medial, while the short leg is flexed and the knee simultaneously taken lateral. The patient's body weight on the blocks makes correction easy, especially after the muscular weakness has been corrected. The patient stabilizes the blocks with his hands during this technique.

7—11. Alternate blocking technique for category II PI ilium on the left. Patient's pelvis is placed into torque by right thigh being brought medial, and left thigh being brought lateral.

Support

Of all the pelvic involvements, the posterior ilium most frequently needs support after correction. Goodheart routinely uses tape support as illustrated (page 94). Taping is of value when the patient is in significant pain and further testing procedures must be accomplished after the category II has been corrected. In sacro occipital technique, a trochanteric belt is used to support the category II correction.

Recurrent Problems

If a category II pelvic fault returns, there is indication that support should be added, or that some other factor has not been corrected. The category II posterior ilium is often involved with relative adrenal insufficiency. This is probably why the posterior ilium is the most common type of category II involvement.

Relative adrenal insufficiency is very prevalent in today's society because of dietary indiscretion and other forms of stress. Therefore the first factor to evaluate is the individual's adrenal function. The sartorius and gracilis may appear normal when the patient is in the office; however, upon ingestion of a poor diet high in refined carbohydrates, the muscles may weaken. Mental or other stress can also cause the sartorius and gracilis to weaken when the patient is away from the office, allowing the posterior ilium to return. The muscles may have regained their strength by the time the patient is in the office, but may not be capable of correcting the structural imbalance. Challenge these muscles as described in applied kinesiology literature.[8,18] (This is discussed thoroughly in Volume V of this series.)

POSTERIOR ISCHIUM

Description

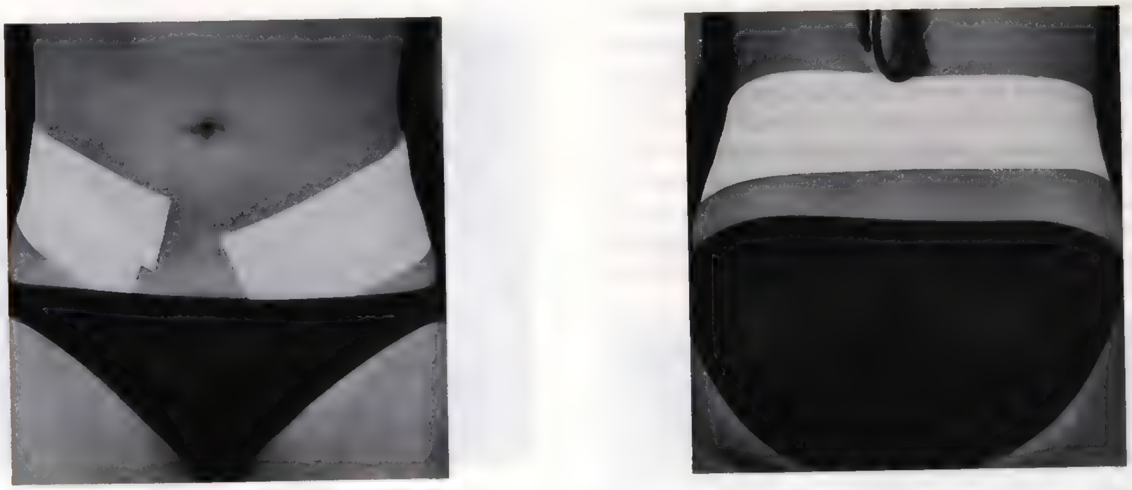
The posterior ischium is a sacroiliac subluxation opposite that of the posterior ilium. It is sometimes called an anterior ilium. The ischium has moved posterior, while the posterior superior iliac spine (PSIS) has moved anteriorly and superiorly. The crest of the ilium has moved anteriorly.

Therapy Localization

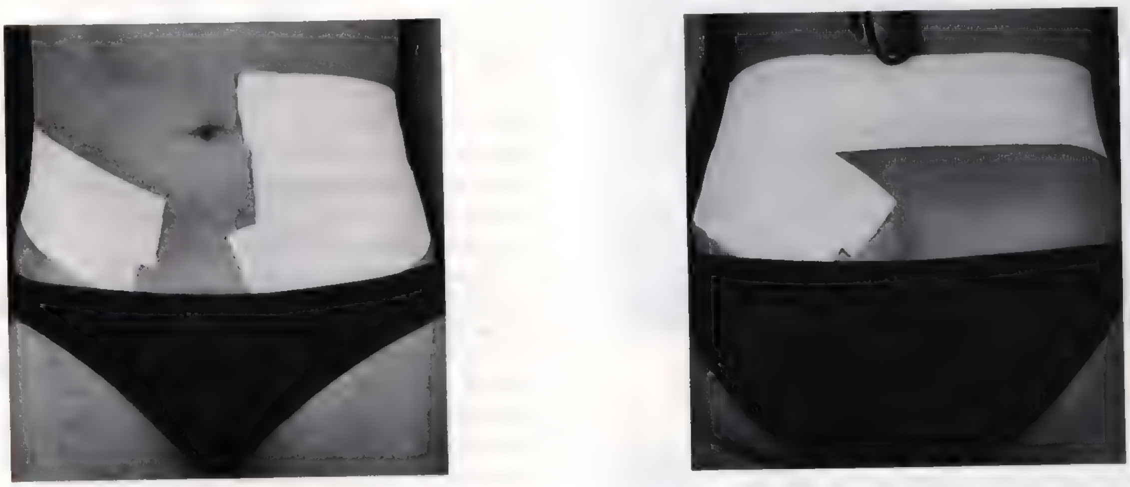
A previously strong indicator muscle will weaken when there is therapy localization over the sacroiliac articulation. Care must be taken that the therapy localization is accurate to the sacroiliac articulation, not just on the posterior superior iliac spine. The same differential diagnosis applies to both the posterior ischium and the posterior ilium.

Challenge

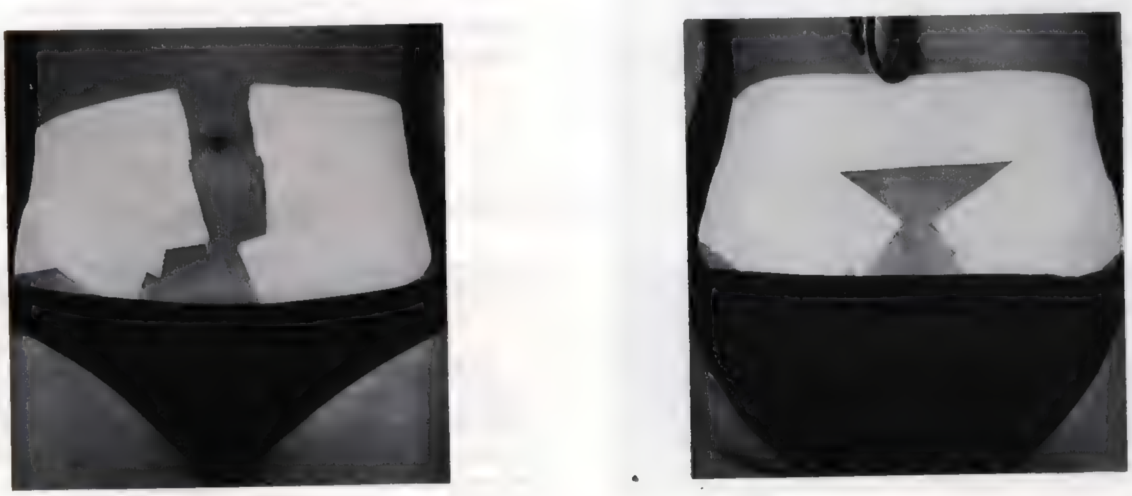
Challenge is directed to the posterior aspect of the ischium in an anterior direction. In the presence of a positive challenge, a previously strong indicator muscle will weaken. If the challenge is being used to differentiate between a category I and a category II, it must be carefully directed only to the sacroiliac on the side being tested. In most cases, this requires stabilization of the sacrum. Failure to do so may allow the force of the challenge to be



7—12. First step for posterior pelvis. The tape anchors across the anterior superior iliac spine, and then goes up around back, to return down to the opposite anterior superior iliac spine.



7—13. Second step begins on the anterior superior iliac spine, goes over the crest of the ilium and down to the opposite sacroiliac articulation. This taping is adequate for a unilateral category II PI ilium on the right.



7—14. Duplicate taping from ASIS to opposite PSIS for bilateral category II PI ilium or total posterior pelvis.

directed through the sacrum to the opposite sacroiliac articulation, thus challenging both sacroiliacs at the same time; this is a criterion for a category I.

Challenge and therapy localization can be done in either the supine or the prone position. When a challenge is given in the supine position, it is difficult to stabilize the sacrum; however, the patient's body weight on the table is sometimes adequate stabilization.

Muscle Involvement

The posterior ischium is permitted by the failure of the hamstrings to give posterior stabilization to the pelvis on the side of involvement. The weakness may be present when testing the hamstrings as a group in the clear; it may be necessary to test the hamstrings individually and with therapy localization to one of the five factors of the IVF to find the weakness. It may also be necessary to test the patient in a weight-bearing position.

7—15. Muscles which are weak in a posterior ischium. Circles delineate tender areas.

Abdominal muscle weakness may also be a contributing factor to a posterior ischium subluxation. Finding this weakness may require individual muscle tests for the various divisions.

Tenderness

There will be tenderness at the ischial tuberosity at the origin of the hamstrings, and there may be tenderness at any or all of the points of hamstring insertion. The biceps femoris has insertion on the lateral side of the fibula and lateral condyle of the tibia. Care must be taken when evaluating the insertion of the semitendinosus and semimembranosus, because their insertion on the upper part of the medial surface of the tibia just below the condyle and at the condyle is very close to that of the sartorius and gracilis.

There will usually be tenderness at the 1st rib head articulation with the sternum, and at the posterior where it articulates with the 1st thoracic vertebra. This tenderness is present because of the distortion taking place in the shoulder girdle; it is the last fixed point from which the body can pull in attempting to restore normal balance.

Postural X-ray

The innominate will be shorter on the posterior ischium side if the x-ray equipment is in alignment and the x-ray is taken weight bearing. It will also usually show shortening if the x-ray is taken non-weight bearing, with the patient lying supine on the table.

Leg Length

The leg will appear to be long on the side of the posterior ischium.

Postural Evaluation

When standing, the patient will have a lower iliac crest on the side of the posterior ischium, and there will be a dropping of that side as he goes into the Adams position.

Correction

Before attempting to correct the posterior ischium, the hamstrings should be evaluated for weakness, both in the clear and with specialized approaches. If the muscle is not found weak in the clear, use therapy localization, weight-bearing test, challenge, etc., to find "hidden" weakness. There is often a weakness with the subluxation. Use appropriate techniques to strengthen the muscles.

Correction of a posterior ischium can be done in the side-lying, prone, or supine position. Each method is effective; the choice depends on the doctor's manipulative ability and the patient's current status.

The side-lying position is with the involved side up. The leg next to the table is straight, and the leg away from the table is flexed at the knee and hip. The foot is usually tucked behind the knee next to the table. If the patient is heavy or very large, it is frequently of value to have the upper leg dangle over the side of the table allowing the leg's weight to help in the correction. The pelvis is allowed to rotate so that the anterior aspect is facing toward the table, while the shoulder girdle is stabilized by the doctor's non-adjusting hand. Contact is made on the posterior aspect of the ischial tubercle, and the adjustive thrust is directed from posterior to anterior, with the line of drive determined by the optimum vector of challenge.

It is more difficult to obtain effective correction of the posterior ischium in the prone position than it is for the posterior ilium. Again, it is of value to have a dropping mechanism such as that on a Thompson terminal point

table. It is often good to place a DeJarnette block beneath the anterior superior iliac spine on the side of involvement. This elevates that side of the patient's pelvis so that when the adjustive thrust is made on the posterior ischium, force is directed into the sacroiliac articulation and is not limited by thigh contact with the table. This technique is best used when there is an externally rotated posterior superior iliac spine, as described below, in combination with the posterior ischium; the block helps correct the rotation.

The DeJarnette blocks can be used in the same manner as described for the posterior ilium when the patient is in a supine position. With the posterior ischium, the first block is placed under the posterior ischium side at the level of the acetabulum at a 45° angle toward the head. The second block is then placed half under the ilium and half under the posterior abdominal musculature on the opposite side. The blocks should be placed equally so that the pelvis is lying level along the vertical axis. The patient lifts his pelvis, rather than the doctor doing it, as described under posterior ilium.

The blocks are not efficiently used for a posterior ischium with the knees and hips flexed and rotated as described for the posterior ilium adjustment.

Support

This type of category II does not require support as often as the posterior ilium subluxation. When support is needed, the trochanteric belt is effective.

Recurrent Involvement

If the posterior ischium category II returns, close attention should be given to the rectum — which is associated with the hamstrings — for hemorrhoids, fissures, etc. The small intestine may also be involved, causing abdominal muscular correlation.

If the involvement returns, evaluation in weight bearing position, walking, and other motion should be done, as with the posterior ilium. Evaluate gait with the patient walking and simultaneously therapy localizing to the SI joint. Find what activities cause the posterior ischium to recur, and then correct them to eliminate the recurring involvement.

EXTERNAL PSIS ROTATION

Description

The reference to external innominate rotation is to the position in which the posterior superior iliac spine moves. Thus an external rotation would be an internal rotation of the iliac crest, which is the way some authors list this subluxation. Care must be taken to avoid confusion with the portion of the innominate listed as in internal or external rotation.

Therapy Localization

As in other category II involvements, there will be positive therapy localization over the sacroiliac articulation. There could also be positive therapy localization over the symphysis pubis. Only one sacroiliac will therapy localize, unless there is a bilateral category II. The positive test will be cancelled when the opposite sacroiliac is therapy localized. If not, consider a category I.

Challenge

Pressing on the posterior superior iliac spine from lateral to medial will cause a previously strong indicator muscle to weaken. Challenge can also be applied to the anterior superior iliac crest in a lateral direction, causing a previously strong indicator muscle to weaken.

Muscle Involvement

The gluteus medius and/or minimus will probably be weak on the side of involvement.

Tenderness

Tenderness may be present at the origins of the gluteus medius and minimus, which are along the outer surface of the iliac crest. Tenderness will also be present at the insertions, which are the lateral and anterior surface of the greater trochanter of the femur.

Postural X-ray

There is widening of the obturator foramen on the AP view, along with a decreased width of the iliac crest.

Leg Length

If no posterior ilium or ischium involvement is present, leg length will be balanced.

Postural Evaluation

The iliac crest may be elevated on postural evaluation. The postural characteristic of a weak gluteus medius is hip, shoulder, and head elevation on the same side. When the patient is in the supine position, bilaterally rotating the legs medially will show greater medial rotation on the side of

7—16. Contacting anterior superior iliac crest for correction of external posterior superior iliac spine subluxation.

external PSIS rotation. The increased leg rotation results from the structural deviation.

Correction

For adjusting in the side-lying position, the leg nearest the table is flexed at the knee and hip, and the toe is placed behind the knee of the upper leg. The adjustive thrust is in the direction indicated best by challenge. It can be directed either to the posterior superior iliac spine, or to the anterior superior iliac crest. Usually the best contact is on the anterior superior iliac crest, with a line of drive posterior and lateral. As usual, the best vector of challenge is the direction for correction.

The involvement can also be corrected in a prone position, with contact to the posterior superior iliac spine in a direction from lateral to medial. However, the best correction is usually obtained in the side-lying position.

Recurrent Involvement

Immediately after correction the subluxation should be re-evaluated by all the examination parameters, to determine if correction has been obtained. If the subluxation returns, there should be more thorough evaluation of the gluteus medius/minimus strength. Support to the reproductive system by additional evaluation of the five factors of the IVF, and possibly vitamin E supplementation, may be of value.

INTERNAL PSIS ROTATION

Description

The posterior superior iliac spine has rotated medially, which causes the crest of the ilium to flare laterally.

Therapy Localization

There is positive category II therapy localization to the sacroiliac and possibly to the symphysis pubis. Only one sacroiliac will therapy localize unless there is a bilateral involvement.

Challenge

A rebound challenging pressure directed to the medial aspect of the posterior superior iliac spine in a lateral direction will cause a previously strong indicator muscle to weaken.

Muscle Involvement

Weak abdominals, including the internal, external oblique, and transversalis, contribute to the subluxation. They do not oppose the pull of the gluteus medius and gluteus minimus, which allows external rotation of the iliac crest and consequent internal rotation of the PSIS.

Tenderness

Typically there is tenderness along the crest of the ilium at the insertion of the oblique abdominals and transverse abdominis.

Postural X-ray

The obturator foramen appears narrower on AP view, and the crest of the ilium appears wider.

Leg Length

This subluxation does not cause an imbalance of leg length unless there is a posterior ilium or posterior ischium associated with it.

Postural Evaluation

When the transverse abdominis is weak, there is a characteristic bulging of the lateral abdomen as the patient raises from a supine to a sitting position. When the patient is lying in a supine position, there will be restricted leg turn-in on the side of involvement due to the structural deviation of the subluxation.

Correction

Adjustment is best obtained with the patient side-lying, involved side up. The leg adjacent to the table is straight, with the upper leg flexed at the hip and knee and the toe tucked behind the knee of the lower leg. The doctor stands in front of the patient, stabilizing his shoulders. The adjusting hand contacts the crest of the ilium with a line of drive anterior and medial in the direction of the vector which gave the most positive challenge. Contact can also be made on the medial side of the posterior superior iliac spine. The line of drive will be in a lateral anterior direction.

7—17. Contact being made on crest of the ilium for correction of an internal posterior superior iliac spine subluxation.

THREE DIMENSIONAL CHARACTER OF SACROILIAC SUBLUXATIONS

The posterior ilium, posterior ischium, and internal and external rotation of the PSIS have been discussed as individual entities. In reality, there is nearly always a combination or a three-dimensional characteristic to the subluxation. All misalignments must be correlated together to correct this characteristic. The challenge, when applied in various vectors, gives the most accurate line of drive for correction. The choice of position for adjusting the patient often depends upon the three-dimensional character of the subluxation. The doctor may choose to use a prone position for certain combinations, and a side-lying position for others. These are individual choices, depending on the manipulative ability of the doctor, the patient's acute involvement, and finally, the equipment available. The correction of subluxations by manipulation is most efficiently done with specific adjustments. When corrections are done accurately, they are easy and non-traumatic. The challenge mechanism gives the information necessary to make accurate corrections. Challenge with various vectors until the maximum change is observed on muscle testing; this is the best vector for correction. It is literally a system of asking the body what should be done.

SYMPHYSIS PUBIS SUBLUXATION

Description

The symphysis pubis can be subluxated as a single entity or in combination with a classic posterior ilium or ischium, with an internal or external rotation subluxation, or with any combination of these. A symphysis pubis subluxation is often present after childbirth because of the stress of delivery, combined with the presence of the hormone relaxin, which softens the ligaments of the pelvis. Within 24 hours of parturition, relaxin is no longer present in the blood and the ligaments tighten, regardless of the articulation's position. The subluxation is also frequently secondary to positions of coitus in the female, and trauma such as falling in a leg-splitting position.

Very frequently the symphysis pubis will be subluxated in combination with a sacroiliac subluxation. Often, correcting the sacroiliac subluxation will correct the symphysis pubis subluxation. If it remains after the sacroiliac correction, then attention should be given to it.

Therapy Localization

The symphysis pubis shows positive therapy localization when a previously strong indicator muscle weakens. Since this location has neurolymphatic reflexes and acupuncture alarm points, care must be taken that it is actually a symphysis pubis subluxation that is being therapy localized.

Challenge

Challenge is directed toward the ramus of the pubis in either a caudal, cephal, medial or lateral direction, or any combination of these. When a rebound challenge is done, a strong indicator muscle will weaken if it is positive. Correction is in the direction of positive challenge.

Muscular Weakness

The pectineus, adductor longus and adductor brevis divisions of the adductors hold the pubis inferior. The abdominal muscles — primarily the rectus abdominis — give superior support to the pubis. While these are the major muscles supporting the pubic arch, all the muscles involved with category II pelvic faults should be evaluated because the symphysis pubis subluxation is usually in combination with the sacroiliac involvement and total pelvic distortion.

Tenderness

If the pectineus is involved, there will usually be tenderness at the superior surface of the pubis between the iliopectineal eminence and the pubic tubercle, and at the insertion at the lesser trochanter to the linea aspera. Adductor longus and brevis involvement will produce pain on digital pressure at the origin, which is along the inferior ramus of the pubis, and at the insertion on the linea aspera.

Postural X-ray

The symphysis pubis subluxation can often be observed on x-ray by the relative heights of the rami of the pubes. There may also be separation or approximation of the symphysis pubis. This x-ray evidence does not necessarily mean that the pubis is or is not in subluxation. It is best to rely on therapy localization and challenge for final determination if adjustment of the symphysis pubis is necessary

Leg Length

There is no direct influence on leg length balance. If there is an apparent imbalance associated with this subluxation, there is probably a sacroiliac subluxation also present, or gross disturbances from adductor muscle imbalance — an inconsistent finding.

Postural and Structural Evaluation

The condition is quite frequently seen by comparison of leg mobility in the classic Fabere Patrick position.[9] On the side of weak adductors, the leg, when in the Fabere Patrick position, will go into greater abduction and external rotation; thus the knee will drop further down toward the table top. If an accurate measurement is desired, the examiner can mark the height of the knee on his own leg, and then compare that with the patient's opposite leg when put in the Fabere Patrick position. To measure this way, the examiner must ascertain that the patient's foot is placed on the opposite knee in exactly the same position when the test is done for comparison from side to side, and that the patient doesn't roll on the table.

Correction

Correction is done in the direction causing a previously strong indicator muscle to weaken. It can be accomplished by directly adjusting the pubis, or by using the anterior

superior iliac crest as a leverage point for additional maneuverability.

Recurrent Involvement

This condition frequently correlates with an upper cervical fixation, especially when one of the bilateral gluteus maximus muscles is weaker than the other. Correlation with the upper cervical area and methods of manipulation are presented by Kotheimer.[11, 12]

Category III Pelvic Fault

A category III involves an intact pelvis. The involvement is in the lumbar spine. There is no therapy localization to the sacroiliac articulations, either single- or double-handed. The involvement in the lumbar spine frequently correlates with a tilting of the intact pelvis, which may put extra stress on the lumbar spine and cause additional problems. The most common tilting of the pelvis is that of the superior aspect tilting anterior. This usually correlates with bilaterally weak gluteus maximus and weak abdominal muscles. The bilaterally weak gluteus maximus muscles are nearly always associated with an upper cervical fixation. Weak abdominal muscles can be associated with poor small intestine function or a sagittal suture cranial fault. The anterior tilt of the pelvis, and weakness of the abdominals and gluteus maximus, will cause hypertonic sacrospinalis and quadratus lumborum muscles. Attention is often given to these hypertonic muscles in the form of diathermy, ultrasound, infra-red, and other modalities to reduce the "spasm." Any benefit from these therapies will be short-lived because they are not primary.

When there is chronic abdominal weakness, the muscles will often need to be exercised after the five factors of the IVF and any digestive disturbance have been corrected. Until these corrections are made, exercising the abdominal muscles is of little value. (See abdominal muscles, Chapter 16).

The category III will be exhibited on plumb line analysis by a lateral deviation of the spinal column. Often there will be sciatic involvement. To evaluate for motion of the posterior 1st rib head, the examiner places his thumbs in the upper trapezius muscle over the rib head. There will be no motion observed of either the right or left rib as the patient fully flexes his head and neck forward, and then fully extends them backward.

Intervertebral disc problems are also associated with a category III pelvic involvement. These are discussed in Volume IV of this series, along with a special type of subluxation called "imbrication."

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Chapter 8

Some Types of Body Organization

Introduction

Organization within the body is primarily controlled by the nervous system, with the endocrine system being a secondary control mechanism. These systems constantly produce signals which are carried throughout the body, primarily by nerve tracts and the blood vascular system. Signals requiring immediate response are generally transmitted by the nervous system, while those dealing more with slower activities — such as chemical homeostasis — are carried by the molecular signals of hormones via the blood vascular system.

When inappropriate signals develop in one of the controlling mechanisms, the target area over- or under-reacts. Signals may also fail to develop when they are required, causing a lack of action of the target area. Signals may be developed properly, but interactivate in facilitated areas to be transmitted to the wrong target area. Signals may be developed and transmitted correctly, but be interpreted incorrectly by the target area. Thus organization of the body is disturbed, or actual disorganization develops.

Much of applied kinesiology deals with evaluating for abnormal organization of body function. When something influences the body in such a way that normal organization is disturbed, functional health problems develop. It may be as simple as discomfort of an articulation or excessive fatigue at the end of the day; it may be more serious, in the form of pathologic states ultimately resulting in disability or death.

Organization within the body is both innate and acquired. Innate activities include organization of the autonomic nervous system, the production of hormones from the endocrine glands, and nerve reflexes, among others. Beginning prior to birth and continuing throughout life, this organization, paramount to life itself, takes care of digestion, thermal regulation, blood pressure, etc. Interference can occur from improper signaling from any side of the triad of health. There is innate organization between the right and left hemispheres of the brain which should predetermine dominancy and, depending upon the organization, has a bearing on the thinking processes of an individual. This will be discussed later under bilateral brain function.

There are certain types of acquired organization which develop in everyone; other, more specialized organization develops in only some individuals. This organization begins early in life when an infant turns his head in the direction of a sound, light, etc. Further organization takes place as walking and running develop — normal activities for all individuals. These normal, organized activities can be performed very efficiently with economy of body activity. On the other hand, as an individual walks or runs, there can be a conflict of muscle activity resulting from improper signaling. This may cause failure of reciprocal inhibition, causing an antagonist to inadequately relax when an agonist is contracting. Not only is needless energy expended, there is strain to the articulations and poor quality of movement. Often the activities produced by the disorganization will cause additional inappropriate signaling, causing further disorganization in body activity.

Specialized acquired skills, such as the pattern of a golf swing, riding a bicycle, or typing, can be acquired by almost anyone with the desire to practice the skill. The degree of efficiency that can be developed will vary among individuals, depending upon heredity and general body organization. Certainly, the skill can be improved by conscientious effort, with a positive mental attitude, but it will be limited if the signaling system is giving inappropriate information.

If the signaling systems are not functioning properly when a new skill is being organized, the final product will not be the optimum level available to that individual. On the other hand, if an acquired skill is developed to a peak of performance, it can be lost due to failure of proper signaling as a result of trauma, chemical, or mental influence.

As discussed under the triad of health, if improper signaling remains for a prolonged period of time, all three sides of the triad will probably become involved. The key factor in applied kinesiology examination is to find the basic underlying cause of the improper signaling to achieve permanent correction. The early effects of improper signaling are usually functional health problems and are easily corrected. If the functional involvement becomes chronic,

it may cause pathology. For example, a foot subluxation can cause improper signaling to the gait mechanism, resulting in improper, poorly-timed facilitation and inhibition of shoulder muscles. At first, this manifests simply as discomfort in the shoulder and shoulder girdle; eventually poor movement and irritation at the shoulder may cause an inflammatory reaction of the bursa. The bursitis may become calcific; thus the first stages of pathology begin to develop. If the condition continues long enough, there will probably be knee and hip involvement, and possibly consequent osteoarthritis. The spinal column will probably not function properly, causing vertebral subluxations which can affect health in many ways. What began simply as an injured foot may, years later, cause numerous health problems.

Before discussing specific signaling mechanisms that applied kinesiology evaluates and treats, let's look at how factors of the triad of health can interfere with different forms of signaling.

Structural

The example of a foot subluxation affecting the shoulder, knee and hip is one of improper signaling from a structural problem. Body organization on a structural basis is very broad and has significant ramifications.

Part of the organization comes from balancing reflexes, such as the labyrinthine, visual righting, and head-on-neck reflexes. Balance and head-on-body organization are also apparently correlated with unique nerve supply, such as the sternocleidomastoid and upper trapezius muscles receiving both spinal and cranial innervation. The tonic neck receptors, very important to equilibrium, are located in the joints of the upper neck, especially in the occipitoatlantal and the atlantoaxial articulations.[25] The labyrinthine mechanism and visual righting reflexes are cranial in nature. It seems reasonable — and clinical results support the idea — that if a cranial fault or cervical subluxation exists, there is conflict between the cranial nerve (spinal accessory) and the spinal nerve supply to these muscles.

Structural trauma may create a cranial fault or cervical subluxation, interfering with any or all of these reflexes, causing considerable stress. This could result in suboccipital neuralgia and further cranial primary respiratory dysfunction, with the potential of affecting the other sides of the triad and causing a myriad of health problems.

Chemical

Dietary imbalance or adverse environmental chemicals can cause improper signaling of both the nervous and the endocrine systems. A simple example is for a chemical stress to cause imbalance of the adrenal gland, as shown by Selye.[33] Adrenal dysfunction by way of neurohumeral control causes an imbalance between the parasympathetic and sympathetic nervous systems. Thus a chemical as an exogenous stimulus causes endogenous chemical imbalance with its signaling errors, ultimately resulting in neurologic imbalance with its signaling errors. The key, of course, is to find the source of original stress, which may be gas leaking from a furnace or any other insidious environmental factor.

Mental

Selye also showed that mental stress can influence the adrenal and cause imbalances similar to those described under "Chemical" above. Other examples of mental causing improper signaling are those discussed by Whatmore and Kohli.[38] They hypothesize several mechanisms, mental and physical, creating errors in signaling which they term "dysponesis." The term, not yet in the dictionary, refers to "dys" (bad, faulty, or wrong) and "ponos" (effort, work, or toil); so it can be considered "faulty effort." Dysponesis can arise as a result of thought patterns which are not in the individual's best interest. Among other types, they can be from excessive attention to interoceptive or exteroceptive input. The interoceptive input could be from unpleasant body sensations, while the external could be from any environmental source. Improper goal orientation or reaction to performance may be a source of dysponetic signaling.

They hypothesize that this causes hyperactivation of the reticular activating system, the posterior hypothalamus, skeletal muscle reflexes, the limbic system, and the neocortex. They go on to state that these errors in signaling produce physiologic alterations that interfere with the efficiency, productivity, and health of the organism; in some instances they lead ultimately to structural change.

Mental processes can influence signals arising from the body which are influencing the viscera or glands. These reflexes and the brain's interaction with them were demonstrated electrophysiologically by Sato.[31] This seems particularly important if the impulses arising from the body portion of the somatoautonomic reflex are in error as a result of a peripheral subluxation or other problem, and are then further altered by mental activity. This could well be what Whatmore and Kohli are alluding to when they delineate excessive attention to interoceptive input as a cause of dysponesis.

Innate Organization

There is considerable organization present in a newborn baby which is genetically determined. This includes simple reflex activities and more complex mechanisms for digestion, excretion, temperature control, acid/alkaline balance, etc. Most of the innate activities of the body are described in standard physiology texts. The discussion here will be confined to inborn organization that is significant in applied kinesiology evaluation, but has not been thoroughly described in standard textbooks.

UNILATERALITY OF BRAIN FUNCTION

The brain appears to be a mirror image of itself; however, there is significant evidence that each hemisphere has a specialty function. It is well-known that the right hemisphere of the brain basically controls the left side of the body, while the left hemisphere controls the right side. While the majority of the nerve fibers decussate, there are some which do not; thus there is some control of the right body by the right hemisphere of the brain, and of the left body by the left hemisphere. This is important, because it enables one hemisphere to take control of both sides of the body in case there is damage to the other hemisphere. The ability of one hemisphere to function as a complete brain is most prevalent below the age of six; after that time the two sides of the brain develop more divergent specialty functions. When there is damage to one side of the brain before the age of four, the undamaged side is capable of developing the special function of the other side. In the adult, damage to one side of the brain will usually impair function specialized on that side.

Functional differences between the two sides of the brain have been known for over a hundred years. In 1861, Pierre Paul Broca[34] localized a center for articulate speech in the frontal cortex; this is now known as Broca's area. In 1865 he made a second major contribution to understanding the different functions of the two sides of the brain. He observed that damage to the speech center on the left half of the brain led to inability to vocalize, but damage to the opposite side did not result in the same loss. This was the first observation that there is different function between the two sides of the brain in most people.

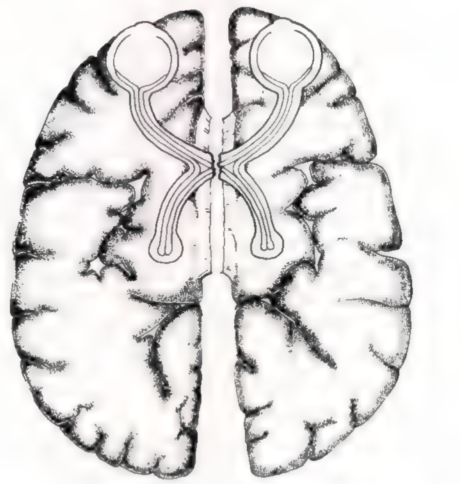
Following this in 1874 Carl Wernicke[34] discovered a sensory speech center in the left hemisphere, now known as Wernicke's area. Continued research, especially that done recently, has confirmed that most individuals use the left brain for verbalization, including speech, the formulation of logical sentences, and recognition of words. When lesions develop in Broca's or Wernicke's area, there is a loss or impairment of the ability to use or recognize words as a source of communication.

It appears that most persons have verbal function specialized in the left hemisphere and spatial activity centered in the right hemisphere. This right/left specialization is based on right-handedness. According to Ornstein,[27] about 5% of the population is left-handed. These persons have less consistency in the development of the two sides of the brain. In some there is reversal of left brain verbal function and right brain spatial function. In others, it appears that both sides are equally developed for both specialties. The usual left brain verbal and right brain spatial orientation is present in still others.

Much of the available knowledge about the different functions of the two sides of the brain has resulted from the study of individuals with destruction of portions of the brain as a result of pathology or surgery. Other studies of laboratory animals have given some indication of bilateral brain function, but animals do not have the same laterality and interplay of the two sides of the brain as humans. The normally functioning human brain has significant communication between its two sides, primarily through the corpus callosum. This communication is necessary for an individual's optimum function.

Electroencephalography reveals which side of the brain is functioning during cerebration directed toward one side of the brain. Ornstein reports ". . . during a verbal test, the alpha rhythm in the right hemisphere increases relative to the left, and in a spatial task, the alpha rhythm increases in the left hemisphere relative to the right. The appearance of the alpha rhythm indicates a 'turning off' of the information processing in the area involved as if to reduce the interference between the two conflicting modes of operation of the two cerebral hemispheres. The brain tends to turn off its unused side in a given situation."

There are several methods described to give input to only one side of the brain. The classic animal research technique is to sever the optic chiasm and corpus callosum, giving visual input to only one side of the brain.



8—1. Severing the corpus callosum and optic chiasm causes each eye to give information to one side of the brain only, thus eliminating the normal overlap of the visual fields.

Separate and even conflicting education can be given to the two hemispheres of the brain. One eye is patched while visual information is given to the uncovered eye, thus presenting information to only one side of the brain. The education may consist of the solution to a specific problem. The procedure is repeated to the other hemisphere, with a different solution to the same problem. The test animal will respond to the problem in different ways, depending upon which eye is given the problem. This experiment has shown that the two sides of the brain are capable of functioning as separate entities when there is a failure of the information to be transferred to the other side. Before separation of the hemispheres, transference of learned information takes place, but it cannot in this type of test. If opposite solutions are taught to the two sides of the brain in an intact animal, it causes confusion and conflict.

In an experiment by Sperry[34] where the two sides of the

brain were taught the same solution to a problem separately, the dichotomic animal received no benefit from the education of the first hemisphere when the second was being educated. In an intact animal, when information is presented to one hemisphere and then repeated to the other, the second hemisphere learns much more rapidly because of the communication of information from one hemisphere to the other through the corpus callosum.

Much has recently been done to understand the different functions of the two sides of the brain. Sperry reports on studies of individuals who have had the corpus callosum severed as a therapeutic approach for epilepsy, and on monkeys where the bisection has been carried down through the root of the brain stem and completely through the cerebellum, leaving only the tegmentum or floor of the brain stem intact for cross communication. These and other studies support the theory that the left side of the brain is verbal, and right side spatial, recognizing the form of objects, etc.

In studies developed by Gazzaniga et al.[11] subjects who had the corpus callosum severed for the control of epilepsy were evaluated for ability to recognize objects by touch, without visual input. When information was presented to the left hemisphere, either by the patient feeling an object with the right hand or seeing it in the right visual field, it could be described either orally or in writing. Mathematical calculation and reading of written messages could similarly be accomplished. On the other hand, when the same information was presented to the right hemisphere by tactile contact with the left hand or stimulation of the left visual field, the patients were unable to accurately describe the object or phrase, or to perform the mathematics. If, however, patients were asked to identify an object they could not describe, they could pick out a similar object from among various items.

In this series of tests, the right hemisphere was capable of performing tasks that required orientation in space, evaluation of shapes, etc. When asked to feel a cigarette (which was out of sight), and to select the object most associated among varied items (not including a cigarette), an ashtray was chosen. When shown a picture of a spoon, a matching spoon was selected from objects out of sight. The interesting aspect is that even after selecting the correct object, the subject was unable to name or describe the object in the picture or the one being held in the hand.

Kimura et al.[21] developed a system to give visual input to only one side of the brain in the intact human. The equipment consists of a box, into which the subject looks at a fixation point, with a visual field on the right and left sides. The subject fixes on the point, and then a tachistoscopic projection of a few milliseconds is projected in either the right or left visual field. Because the visual image is of short duration, the eyes do not have an opportunity to refix on the visual projection; thus the projection only stimulates the retina to excite the visual cortex in one hemisphere. In this case, the visual cortex can communicate with the opposite hemisphere because the corpus callosum is intact. They also developed more sophisticated systems of two- and three-field tachistoscopes.

The same group modified a dichotomic listening test wherein a spoken digit is presented to one ear and a different spoken digit to the other. After a sequence of such numbers, the subject is tested to determine which numbers are heard. In the original study, patients with damage to the left temporal region of the brain reported fewer digits correctly than patients with damage to the right temporal region. A further finding was that individuals who had no brain damage had a better score when listening with the right ear. Neurologically, the auditory system has less decussation than vision or other areas of the body; however, there is still a greater amount of stimulation of the left brain when material is heard through the right ear, and vice versa.

These visual and auditory experiments revealed that the left hemisphere was dominant on an auditory basis in words and speech sounds, while the right hemisphere was dominant in melodic pattern and non-speech (human) sounds. On a visual basis, the left hemisphere was dominant on recognition of letters and words, while the right hemisphere excelled in two-dimensional point location, dot and form enumeration, matching of slanted lines, and stereoscopic depth perception.

On a manual basis, the left hemisphere was dominant in skilled movements and free movement during speech. The free movement during speech was a study of gestures while an individual is speaking. In individuals where speech is controlled by the left hemisphere, the right hand makes more free movements than the left. This asymmetrical use of the hands was found only when the hands moved freely in space without touching the body. The ratio of right hand movement to left was 3:1.

Restak[30] reports on an extension of Kimura's study of hand gesturing while speaking done by Kinsbourne. He measured hand and arm gestures while individuals were speaking on complex philosophical topics. Here the gestures tended to involve both hands, rather than just the right, as Kimura found. Kinsbourne believes this finding supports the view that both hemispheres are involved in imaginative and speculative thought.

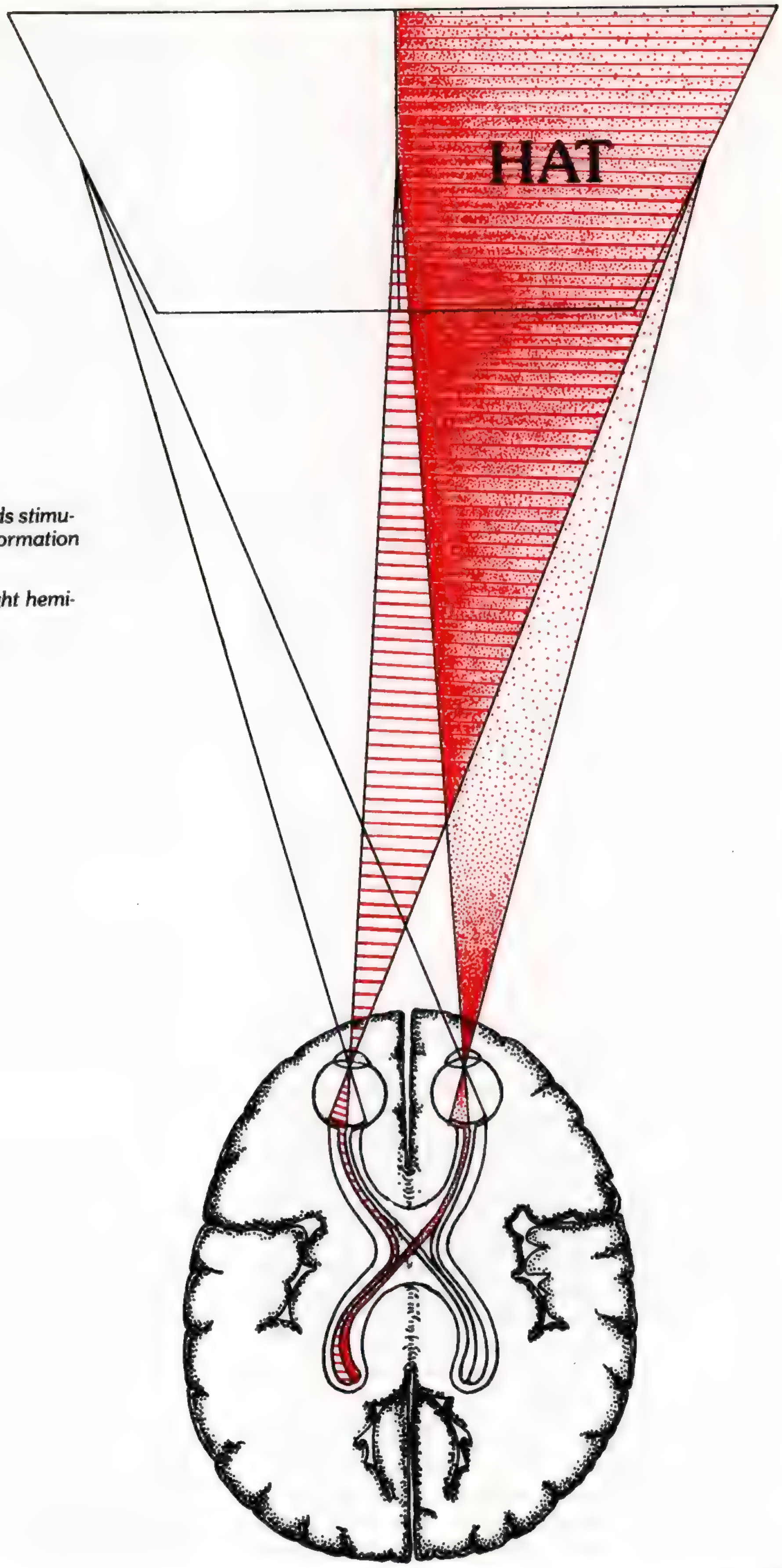
In our culture a significant importance is placed on verbalization to express ideas, and mathematics for evaluation and general scientific investigation. This is probably why the right side of the body and left brain are called dominant in the usually organized individual. It is "dominant" because we tend to place more emphasis on its function. The left side of the body and the right brain, being spatial, intuitive, and tonal, have their own important roles which are significantly played down in most of our society. It seems reasonable that the well-organized individual has effective use of both sides of the brain and the body with efficient interplay, neither side being dominant, neither side being ineffective. There is significant evidence that each side plays a dominant role during different types of thinking.

A considerable amount of evidence exists that the right hemisphere is tonal and spatial. It also appears to have intuitive and parapsychological function; however, much less is known about these activities. Bakan[1] presents convincing evidence that dreaming is associated with the right hemisphere. Rapid eye movement (REM) is well-established with the dreaming state. Electroencephalographic recordings during sleep support the right brain

Vision fixed at center

"HAT" projected for a few milliseconds stimulates only the retina, giving direct information to the left hemisphere.

Information of "HAT" transfers to right hemisphere by the corpus callosum.



activity during REM and dreaming. Individuals who have either brain injury or commissurotomy reported a cessation of, or severely diminished, dreaming after the involvement. There is the thought that the individual may continue to dream, but because of the inability of the two hemispheres to communicate, the left side does not obtain the information in order to verbalize the dream experience of the right hemisphere.

A very interesting report by Bakan discusses dreaming, the right hemisphere, and schizophrenia. He reports that several in the field of psychology parallel madness and schizophrenia to a dreamer, and that any schizophrenic statement will sound completely normal if introduced by the phrase, "I dreamed that . . . ." He hypothesizes, ". . . it is possible that schizophrenia involves a spillover of right hemisphere mentation into periods which should be under greater control of left hemisphere mentation. In the normal person, right hemisphere mentation with its hallucinatory-fantasy content is confined to dreaming periods (REM). In the schizophrenic, the barrier which keeps right hemisphere mentation confined to dreaming periods breaks down, and there is a spillover of right hemisphere mentation into the waking life, where it can influence overt behavior and best produce the bizarre behavior found in schizophrenics. This analysis suggests that at least part of the pathology in schizophrenia is pathology of the hemispheric functioning of the brain." Bakan's hypothesis is especially of interest in applied kinesiology. The working hypothesis used in the treatment of schizophrenia with applied kinesiology evaluation and therapeutics is thoroughly explained in Volume V.

Trotter reported an interesting study[36] on a project directed by anthropologist Solomon H. Katz of the University Museum at the University of Pennsylvania. Katz studied Inuit Eskimos, known for their unusual gestalt (integrated) abilities, such as drawing accurate maps of their territories. The activities of these Eskimos, including their language, reflect a high degree of spatial right hemisphere orientation. Linguistic studies rate their language as the most synthetic of languages; American English is at the other end of the same scale and is rated as the most analytic (left hemisphere).

The Inuit people are also known for their soapstone and whalebone sculptures, woodcuts, lithographs, and tapestries. This artwork has been described as "voluptuous, symbiotic, and timeless in character." Their art has a floating, helter-skelter, without apparent linear three-dimensional analytic orientation. The art indicates a spatial, or as we interpret it, right-brain quality.

Katz determined to study these Eskimos because it would appear that these right hemisphere functions are more highly developed in them than in modern urban populations. The study was carried out by observing and videotaping how the stone carvers used their hands and eyes in performing their work. Katz's desire was to determine if the spatial and synthetic abilities resident in the right hemisphere play an important role in the creativity expressed in the carvings. From numerous video recordings of the Eskimos at work, he found that in the process of carving, they used the right hand to hold the tools and carve the intricate details of the work, while the left hand felt and held the work, re-positioning and evaluating it as progress continued. While the work took place, the carving was held in the left visual field, which gives signals to the right hemisphere. These studies indicate that the Inuit Eskimos use the left brain and right side of the body for intricate activities, such as the tool holding and carving, while the right hemisphere and left side of the body evaluate the artistic nature of the activity.

From recent research done regarding the different functions of the two sides of the brain, it appears that there is a set pattern for most people organized with right hand dominancy. Bogen[3, 4, 5] and Ornstein each presented a set of dichotomies of the characteristics of the two sides. Ornstein stated he presented the table ". . . only for purposes of suggestion and clarification in an intuitive sort of way, not a final categorical statement of the conception. Many of the polls are, of course, tendencies in specializations not at all binary classifications." Here, too, we will consider a tentative dichotomy for the functions of the two sides. This list was developed by observing research which has been discussed here, and from clinical observations of applied kinesiology findings.

RIGHT AND LEFT SIDE OF BRAIN

A TENTATIVE DICHOTOMY

Left Brain	Right Brain
Right body	Left body
Logical	Non-logical
Mathematical	Tonal
Rational	Nonsensible
Reasonable	Unpredictable
Practical	Non-practical
Linear	Spatial
Masculine	Feminine
Intellectual	Intuitive
Argument	Experience
Negative	Positive
Time, history	Eternity, timelessness
——	Under some circumstances, clairvoyant, clairaudient, clairessential

There are several ways that an improved understanding of the different functions of the two sides of the brain is of value in understanding body function and putting it to practical use. The experiments and studies that follow give additional basis for some of the applications of knowledge about the specialties of the two sides of the brain as used in applied kinesiology.

An experiment to determine the effect of brain activity on manual skills was performed by Kinsbourne and Cook.[22] A dowel is balanced on the index finger of the right hand (controlled by the left hemisphere). If the individual verbalizes, activating the left hemisphere, the ability to balance the dowel will be diminished. When the dowel is balanced on the left index finger and the individual ver-

balizes, the balancing ability is improved. The interpretation of this is that when the individual verbalizes, he is activating the left brain. This activation reduces the ability of the left brain to control the right hand, thus limiting balancing capability. On the other hand, when the balancing is being done with the left hand, the verbalization activating the left brain keeps that logical brain from interfering with the intuitive right brain, which is controlling the balancing of the left hand.

There is evidence that observing body motion can help determine which side of the brain an individual is using. This is evidenced by studies such as that of Kimura et al. already discussed, observing that right hand movement was in excess of left on a 3:1 ratio when an individual is verbalizing. In a study by Schwartz et al. reported in *Science News*,[32] there was a study of lateral eye movement (LEM) while individuals reacted to various questions. Most often there will be a glance either to the right or left before responding to a question. The questions were divided into four categories: verbal, non-emotional questions ("What is the primary difference between the meanings of the words 'recognize' and 'remember'?"), verbal emotional questions ("What is the primary difference between the meanings of the words 'mischief' and 'malice'?"), spatial non-emotional ("On the face of a quarter, does the face of George Washington look to the right or to the left?"), and spatial emotional ("When you visualize your father's face, what emotion first strikes you?"). The LEM's were recorded and correlated with the type of question asked. When a verbal, non-emotional question was asked, the eyes would most often deviate to the right, indicating left hemisphere activity. When spatial emotional questions were asked, the eyes most often deviated to the left, indicating right hemisphere activity. When the questions were mixed, with both verbal and spatial thought required, the LEM's fell predictably between right and left activity.

Practical application in observing lateral eye movement has been put to use on an empiric basis by Bandler and Grinder.[2] They use eye movement as clues to how an individual is accessing the brain, to better understand the person's psychological aspects. They have added lateral-vertical movement as indicating specific accessing cues. They propose the following for the normally organized right-handed person.

Eyes up, right	Visual constructed images
Eyes right	Auditory constructed sounds or words
Eyes down, right	Kinesthetic feelings (also smell and taste)
Eyes up, left	Visual remembered (eidetic) images
Eyes left	Auditory remembered sounds or words
Eyes down, left	Auditory sounds or words

Bandler and Grinder present an interesting hypothesis regarding the way the mind works. Their writings are recommended for an expanded viewpoint of mental activity. There appears to be significant practical application in mastering the observation of eye and body movement to understand the psychological activity taking place within individuals with whom you are communicating.

For example, if, while you are discussing a patient's condition, the patient's eyes move up and to the right, there is evidence he is constructing a visual image of what you are saying. If, however, his eyes move up and to the left, he is tying in what you say with an already constructed — or in other words a remembered — visual image. If during the discussion the patient's eyes move down and to the right, which according to Bandler and Grinder correlates with kinesthetic feelings, he desires to feel what you say. This is the type of individual on whom a demonstration of muscle testing will be effective patient education. On the other hand, if the eyes move down and to the left, the patient is correlating what you say with previous education stored in his mind as words, i.e., the patient is having a conversation with himself about what you are telling him.

A Bulgarian doctor and psychiatrist, Gorgi Lozanov, has apparently used aspects of bilateral brain function, among other techniques, to develop improved learning methods. Ostrander and Schroeder[28] report that these methods claim to account for learning 1,000 and more words of a foreign language per day with increased retention. A significant aspect of the procedure is for the individual to first use several techniques for relaxation before the learning session begins. Positive affirmations are given for the success of the learning session, which are accentuated by the actual learning successes that are achieved. The positive affirmations appear to influence the intuitive aspects of the right brain, and diminish the logical, negative influences about learning of the left brain. During the relaxation procedures and the education, Baroque music in 4/4 time at 60 beats per minute is played. The student brings his breathing into time with the music, and the education given by the instructor is timed with the music. The instruction uses an eight second cycle for pacing spoken data at slow intervals. The spacing of the information can be done in several ways. An example is four seconds of silence and four seconds of information. Four seconds of silence are repeated, and four more seconds of information. The procedure continues with the specific timing.

This system can be used with almost any type of learning process. Experiments have been done in western civilization with excellent results. Ostrander and Schroeder describe how the system can be used for learning, coaching children, performance in sports, pain control, and developing parapsychological abilities. The system seems almost too good to be true; however, it is recognized that humans currently use only a very small percentage of their potential.

BILATERAL BRAIN — PRACTICAL APPLICATION IN AK

Therapy Localization

Occasionally there is involvement of an organ or gland which can be observed on a clinical basis, although it is not evidenced in muscular weakness or hypertonicity. It is hypothesized that the connection is present; however, it is not observed by manual muscle testing. This may be from some mechanism within the body attempting to return the energy and control patterns back to normal, to repair or control organ or gland dysfunction. Since the muscle does not have direct pathology, improved control or energy to the common pathways brings it into better function, even though the primary gland or organ is not yet functioning in a normal manner.

Under the hypothesized conditions, Goodheart[14] observed that when a structure or reflex associated with the malfunctioning organ or gland is therapy localized, there may be no change in muscular strength, except when combined with one-sided brain activity. When the individual is requested to either hum (activating right brain) or say multiplication tables (which activates left brain), there may be an immediate and dramatic weakening of the muscle which previously failed to give evidence of involvement. The same tonal or mathematical activity under these conditions does not cause any weakening when there is no therapy localization, nor does it if other, random, noninvolved areas are therapy localized.

The attention of the "mind" seems to be directed to one portion of the brain at a time.[16] Hypothetically, activation of one side or the other of the brain puts the dysfunction that apparently is present at the point being therapy localized in contact. The point fails to show positive therapy localization with usual testing procedures because there is no contact with the dysfunctioning side of the brain. The humming or multiplication tables — depending on which side of the brain is involved — makes this contact.

The factor which is therapy localized and found positive during right or left brain activity is treated as usual. It may be a reflex, an area which needs manipulation, acupuncture point, etc. After treatment has been administered the area is again therapy localized with the right or left brain activity to determine if correction has been obtained.

It is interesting that when the humming consists of a simple tune, such as "Happy Birthday," and the effect is present, it is usually not present when "Happy Birthday" is sung. This is apparently because singing requires verbalization as well as a melodic pattern, and is accessing both sides of the brain. This presents a problem in some individuals, because when they try to hum a very familiar tune, such as "Happy Birthday," there is a silent verbal component as they mentally activate the words along with humming the tune. If this is suspected, it can be overcome by having the patient make up a tune which requires the creative aspects of the right brain. Another system this writer has found successful in activating the right brain is to have the patient feel the texture, size, and shape of an object. This spatial task requires right brain activity. Do not let the patient see the object; rather, place it in his hand. Also, do not ask him to describe the object, which activates the verbal left brain.

Prolonged therapy localization of a point while activating one side of the brain may temporarily eliminate the positive therapy localization initially present with the activity. This seems to indicate there is potential therapeutic activity with therapy localization, especially if it is combined with specific types of activity. As has been mentioned in the therapy localization section, a point which shows positive therapy localization may cease to be positive if the therapy localization is held for a long period of time. The addition of bilateral brain activity, such as humming or multiplication tables, seems to reduce the time of abolishing the positive therapy localization. This is poorly understood and does not seem to have lasting therapeutic results.

Improving Skills

Applying knowledge that each hemisphere of the brain has specialty function, Hammer[17] devised a system for improving intuitive manual function. In golf, putting is a combination of logical, reasonable analysis of the green, its contour, the direction of the green, etc., which is left brain thinking, and an intuitive right brain control for the exact amount of force necessary to putt the ball for a given distance. After the golfer has made the left brain analysis, Hammer attempts to switch the thinking to right brain intuition by having the golfer's right hand overlap the left and simply go along for the ride, depending more upon the left arm and hand for control. Since the left brain, with its logical, reasonable, practical capability, can interfere with right brain intuitive function, he instructs the golfer to visualize the ball going into the cup, eliminating any doubt, expressing inner confidence, and knowing that the putt will be made. Right brain activation diminishes left brain interference by de-activating the left brain, as has been shown on electroencephalographic studies.[27] In the early stages of using this process, eight out of ten golfers significantly improved their putting scores.

In a later addendum, Hammer[18] attempted to add to the procedure, having the golfer hum to improve activity of the right brain while putting. Humming interfered with accuracy until the procedure was changed to have the golfer hum on the backswing, and to discontinue humming after the backswing was completed. Again, the left arm was made dominant with a cross grip so the left hand was below the right.

Humming throughout the stroke, interfering with accuracy, correlates with Kinsbourne's finding as reported by Restak[30] in an experiment of humming along with piano playing. Humming interfered with left hand activity. Again it seems that the brain cannot perform two functions efficiently at the same time if the activities are closely connected.

Hammer conducted an experiment with eight subjects to determine change in golfing capabilities, using (1) the golfer's own procedure, (2) putting, using the left arm and hand with continuous humming, and (3) using the left arm and hand with discontinued humming after the backswing. The subjects were to putt a ball ten feet on a level path into

three holes, ten times using each method. In order to prevent improvement from practice, the three methods were used in different order on the three holes. The discontinued humming method resulted in 3.5 holes-in-one, compared with 1 hole-in-one with the other two methods.

Chipping and putting are the primary examples of using intuitive force to hit a golf ball a given distance. Most golf shots require only proper selection of a club (such as a 7-iron to hit the ball 150 yards), determination of trajectory (height, fading or drawing of the ball), and having a mechanically sound, reproducible swing.

Paralysis

Goodheart, using humming or mathematics to activate one side of the brain, observed some unusual effects on individuals paralyzed as a result of spinal cord injury, strokes, etc. Therapy localization generally cannot be used in locations lacking sensation. It was observed, however, that positive therapy localization could sometimes be obtained in these individuals when either the right or left brain was activated by humming a tune or saying the multiplication tables. When therapy localization was obtained in this manner, he would then evaluate for the involvement present. When the type of correction needed was determined and correction administered, there would be a removal of the positive therapy localization while the patient used the unilateral brain activity.

Hypothesizing that if activation of the brain on one side by humming or multiplication tables would give connection to reveal positive therapy localization when it was not present prior to the activity, Goodheart attempted to have a patient activate paralyzed muscles with unilateral brain activity. He asked the patient to lift his right leg while saying the multiplication tables. The patient continued attempting to lift his leg while doing the multiplication tables; when he reached 2 x 39, the leg lifted. Although the patient had attempted earlier for prolonged periods of time to lift the leg, there had never been any success. Attempting the same experiment on the opposite side, the patient hummed a tune, activating the right brain, and attempted to lift the left leg. After approximately two minutes of humming and effort to lift the leg, it also moved.

Although this utilization of unilateral brain activity is in a very infantile stage, it promises potential training approaches for reactivation of the nervous system in paralysis. The procedure has been repeated on individuals with strokes and other types of nerve damage, and is an important area for further research. Similar approaches have been used to facilitate re-training programs in paralysis cases. Researched training programs include placing the patient in specific positions (including prone or supine, head position and posturing) to activate the tonic neck receptors, body-on-body reflexes, etc.[19, 35] These procedures have been shown to enhance the re-educational program when various types of pathology and trauma have led to paralysis.

TEMPORAL TAP

The temporal tap is an applied kinesiology mechanism for penetrating the filter of the sensory system. What we are capable of conceiving depends on innate body mechanisms which filter our ability to sense the external and internal stimuli constantly being presented to the nervous system. Prior experience also influences our perception of sensory stimuli. The temporal tap apparently deals with the filter of the sensory system, as well as with bilateral brain function. Discussed below are some of the factors that influence our perception of the environment around us. This will give a better understanding of what the temporal tap apparently does in changing our perception.

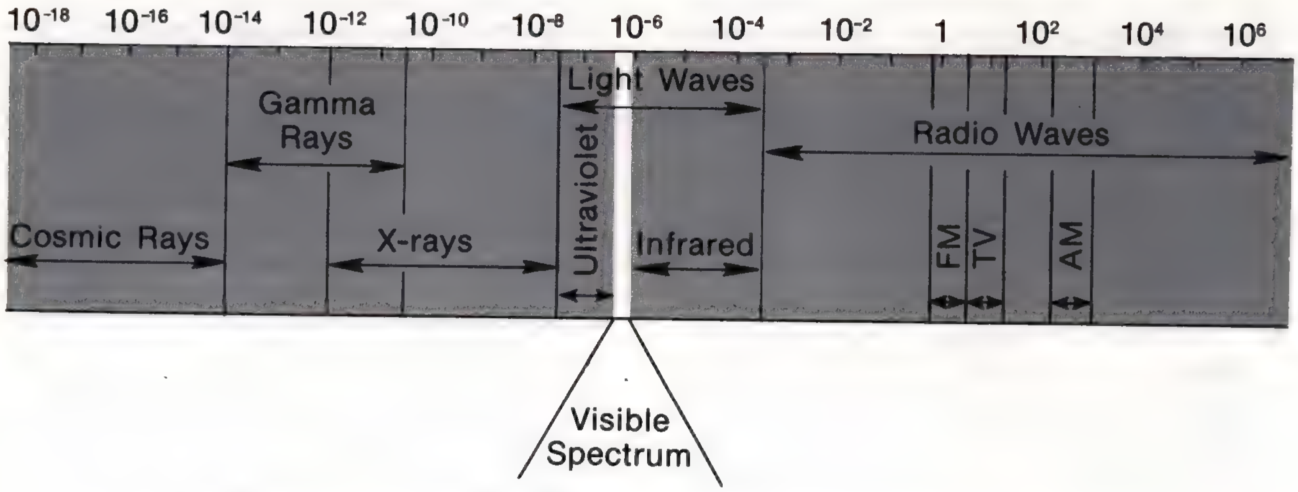
Influence on Perception

The nervous system is bombarded with stimuli, much of which is unnecessary for the survival and immediate requirements of the organism. If man were aware of all the stimuli in his environment, there would be much unnecessary processing and the system would probably be overwhelmed.

There are many mechanisms which act to control sensory input to the system. Depending on need, various species have different regulation of the sensory input. A study by Lettvin et al.[23] of the frog's eye, and the signals transmitted by various stimulation, revealed that only four basic types of information were sent to the brain. Stimulation in the form of movement, colors, and shapes in various combinations were presented to the frog's visual field. The information sent to the brain was evaluated by microelectrodes placed in the frog's optic nerve. The four types of messages were termed sustained contrast detectors, moving edge detectors, net dimming detectors, and net convexity detectors. The electrical impulses did not change when general changes of the environment were produced; thus the first group — the sustained contrast detectors — gave general information about the environment. The moving edge detectors picked up sudden movements, shadows, etc., such as that presented by a bird of prey — apparently a defense mechanism. The third type — the net dimming detectors — responded when sudden changes of light developed, such as would happen when a larger animal cast a shadow on the frog. The final type — the net convexity detector — is for the recognition of insects when they come close enough for the frog to capture. Impulses were sent when small, dark objects came into the field of vision quite close to the eye, and there was change in light or contrast.

The human likewise filters out most of the electromagnetic spectrum by special sensory capability. Visible light is only a very small portion of the spectrum, ranging approximately between 380-760 billionths of a meter.

The nervous system itself adapts to low priority sensory input. The large afferent (Group II) nerve fibers adapt to constant low velocity or low intensity stimulation. When



8—3. ***The electromagnetic spectrum.*** *Observe the small amount of sensory availability to the human eye. Without this limitation we would be bombarded by x-rays, radar, television, and radio frequencies that are constantly in the environment though we are not aware of them. More extreme ends of the electromagnetic spectrum are frequencies of cosmic rays and electromagnetic activity from power lines.*

first putting on clothes, we are aware of the pressure; after wearing them for a short period of time the fibers adapt so that we are no longer aware of this stimulus, unless attention is drawn to it. When first sitting in a chair, the pressure of body weight on the chair is apparent, but the body soon adapts. Sudden changes of pressure, temperature, etc., are easily recognized, but adaptation is rapid if the stimulus is non-noxious. Adaptation takes place in response to constant stimulation which is not significant to the body. For example, an air conditioner can create considerable noise, movement of air mass, and a cooling effect. When the activity of the air conditioner begins, various stimuli are quite noticeable; however they are rapidly adapted to and become unnoticed. Cessation of the activity will immediately be noticed.

Because we must discriminate between continuous safe stimuli and survival-related ones, we have evolved sensory systems which respond primarily to alterations in the external environment. When there are no changes in the environment, the stimulus becomes subliminal and the body does not react. When some new stimulus enters the environment the nervous system action is based on the change, and action may take place.

Our perception is governed by previous experience. Unless something informs us that our previous experience is incorrect, the mind will continue to depend upon its previous conceptions. Ittelson and Kilpatrick[20] discuss methods of studying visual perception developed by Adelbert Ames, Jr., of the Institute for Associated Research in Hanover, New Hampshire. These studies indicate that man interprets what he sees by previous experience. An interesting experiment is to place an individual in a darkened room. Two balloons are placed at a distance from the subject, each illuminated from an unseen source. The illumination can be varied so that one balloon becomes brighter than the other. Also, the balloons can be enlarged or reduced in size by increasing the volume of air, again from an unseen source. As the subject looks at the balloons, he is requested to determine which one is closer and which is more distant. The subject does not know that the balloons are stationary, located at a set distance. The subject's previous experience is that closer objects are larger and brighter; thus the examiner can make the balloons appear to move closer or further away by simply changing the size and the intensity of light. As they get larger and brighter, the subject reports them coming closer; upon decreasing size and brightness, they appear more distant.

Many experiments have been done which reveal that what we perceive is from prior experience and education. The conceptualization of sensory input is from what we believe to be true. Many of the concepts that humans hold are limiting. The comment to the butterfly is appropriate: "Of course you can fly, but first that cocoon must go."

Ornstein[27] postulates and gives experimental evidence that the autonomic nervous system, which has control of the innate physiologic systems of the human body, may not be completely involuntary. The autonomic nervous system is subject to voluntary control if the situation is set up appropriately. Yogis can alter their heart rates to 300 beats per minute, or significantly change body temperature. Other alterations include those of blood flow to various limbs, increasing or decreasing kidney urinary production, pancreatic secretion, heart rhythms, and removal of blocks in an EKG that were produced by morphine.

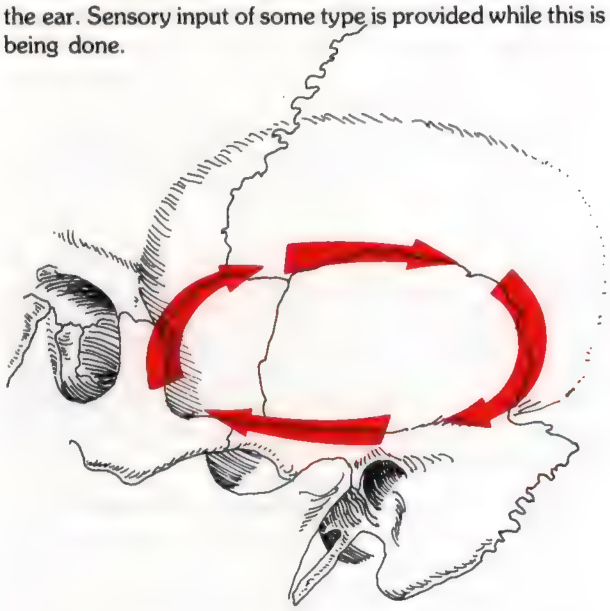
In dealing with the nervous system, it is necessary to be constantly aware of what stimulates action and how the body adapts to it. Discussed briefly here have been some of the mechanisms which influence the nervous system and thought processes. Stimulation may be adapted to, modified by previous experience, or changed by mental activity. The temporal tap seems to be a mechanism which provides an opportunity for working with these processes. Presented here is an exploratory hypothesis giving clinical

indication that these processes are being dealt with. Although a clinical working hypothesis is being used, we must be careful about premature conclusions. The results of temporal tap use are philosophically intriguing and seem to be clinically effective.

Description

The temporal tap was introduced when Goodheart[13] became intrigued by the reportedly good results of a Czechoslovakian doctor who helped individuals reduce smoking by giving positive affirmations while manipulating the temporal bone. When Goodheart attempted to contact the doctor, he received a letter stating that the man was deceased, eliminating any further information from that source. Goodheart's first attempts at penetrating the sensory system by giving positive and negative thoughts and other sensory stimuli while manipulating the temporal bone, etc., were unsuccessful. After considerable experimentation, a successful method was found.

The temporal tap consists of tapping around the temporal sphenoidal diagnostic line, beginning just in front of the ear at the point associated with the psoas. The tapping is continued along the zygomatic process, upward at the margin of the temporalis muscle, proceeding around the temporal sphenoidal line to superior and posterior of the ear. Sensory input of some type is provided while this is being done.



8—4. Begin anterior to the ear and tap sharply around TS line.

The temporal tap is used to penetrate the sensory filter, influence some types of therapy, control some involuntary activities, and give additional therapy localization information. Temporal tapping has different reactions, depending upon the side of the head tapped. This apparently correlates with the different dominancies of the two hemispheres of the brain. Temporal tap as described here correlates with the individual who has the usual organization of right-hand dominancy and left-brain verbal organization. The activity may need to be reversed for left-handed dominancy; it may not work effectively on an individual with mixed dominancy.

When the temporal tap is administered, some type of sensory input must be given simultaneously. It can be auditory in the form of a suggestion, visual as a written message, mechanical by application of therapy, or by therapy localization. The temporal tap apparently helps enter the sensory input to the brain for consideration.

There are specific reactions observed on manual muscle testing after temporal tapping with different types of sensory input. By observing the muscle test response, considerable information can be derived about the patient's organization, as well as how the body is reacting to the sensory input.

Some of the sensory input given the patient during temporal tap is in the nature of a suggestion. Suggestibility varies among individuals, depending upon the person receiving the suggestion and on the ability of the individual providing it. Suggestibility seems to be increased when the suggestion is given simultaneously with the temporal tap. It is interesting to observe that if the temporal tap is administered incorrectly, increased suggestibility does not develop. Also, several of the sensory inputs to the patient during temporal tapping are not verbal and are not recognized by most patients. These include the sensory input from therapeutic measures and therapy localization.

Mechanics

The protocol for temporal tapping must be followed specifically in order to obtain consistent results and information. As mentioned, the tapping begins anterior to the ear and progresses around the temporal sphenoidal diagnostic line. Tapping should be sharp enough to cause the examiner's fingers to bounce away from the skull. When there is a puffy hairstyle, such as a bouffant or a tightly curled permanent, there is too much shock absorbing mechanism in the hair for the standard tapping action to be effective. This is also true if considerable hair spray is used. Wigs, too, will interfere with adequate tapping over the temporal sphenoidal line. Although the tapping must be snappy and solid, it should not be so hard as to be traumatic. Other methods of stimulating the TS line have been attempted, such as ultrasound, vibrators, pinching, rubbing, electrical stimulation, etc.; they have not demonstrated effectiveness.

The portion of the hand with which the examiner taps is important for effective use of the temporal tap. The examiner must use the palmar surface of his right fingertips to tap the patient's left TS line. When tapping the right TS line, he uses the palmar surface of his left fingertips. The palmar surface is apparently required because of the positive and negative electromagnetic aspects of the hand. The opposite hand can be substituted by using the dorsal surface, such as the knuckles of the closed hand. In this case, the examiner uses his left knuckles on the patient's left TS line, and right knuckles on the right. The patient can tap his own TS line; however, the handedness is reversed. The patient uses the palmar surface of his left fingertips on the left TS line, and the palmar surface of the right on the right. If using the knuckles (dorsal surface), the patient would use his right hand on his left TS line, and vice versa.

There is the occasional individual who does not seem to have the usual right-left specialization of the hemispheres; rather, it is reversed. This probably is a congenital variance, such as visceral inversion. Occasionally it appears important in applied kinesiology to determine whether the individual should be right-handed or left-handed on a congenital basis. This will be more easily understood when neurologic disorganization and organized dominance throughout the body are discussed. The use of the temporal tap appears to be effective in making this determination. The hypothesis for evaluating function of the hemispheres relates to presenting a true or false statement to the patient while temporal tapping is being done.

The hypothesis for evaluating function of the hemispheres relates to presenting a true or false statement to the patient while temporal tapping is being done. Simultaneously, a previously strong indicator muscle is tested to determine if it weakens. It appears that in a normally organized right-handed individual, a positive or true statement will be accepted on the left side of the head, while a negative or false statement will be accepted when the right side is temporal tapped. For example, if the examiner taps with the palmar surface of his right fingertips on the patient's left TS line and gives sensory input such as, "You have blond hair" when the patient is brown-headed, a previously strong indicator muscle will immediately test weak. If the statement, "You have brown hair" is given, there will be no weakening of the indicator muscle. The opposite takes place when the temporal tap is done on the right side of the head. In other words, the false statement of "You have blond hair" will not weaken a previously strong indicator muscle after temporal tapping, but the true statement of "You have brown hair" will cause it to weaken.

A large percentage of left-handed individuals will respond exactly opposite. Some individuals are poorly organized, and there is poor differentiation between the temporal tap characteristics of the two sides. These individuals do not respond well to the temporal tap. Sometimes as general body organization is improved, there will be a simultaneous improvement of temporal tap mechanics.

The use of the temporal tap with positive and negative statements opens many questions about the mechanism taking place. The procedure was developed from the clinical observation that temporal tap mechanics were ineffective in some individuals who were generally neurologically disorganized, as will be discussed in the next chapter. The effects of the temporal tap improved as the patient showed better evidence of organization after applied kinesiology evaluation and treatment. There remained some individuals who had mixed dominancy and were difficult to re-organize. The mechanism of the temporal tap and the reason for different effects on the two sides remain to be demonstrated.

Temporalis Muscle

In some manner, the temporalis muscle and the temporomandibular joint appear to interfere with the temporal tap. Evidence of this is derived from clinical findings that when the patient holds his jaw in a retruded position, the effects of the temporal tap cannot be elicited. Bringing the mandible into a retruded position requires activation of the posterior fibers of the temporalis muscle. If the posterior fibers of the temporalis muscle are hypertonic, there will be no effect from the temporal tap, even though the mandible is not held in a retruded position.

8—5. Ellipse indicates the probable area of muscle spindle cell involvement if the posterior fibers of the temporalis muscle are hypertonic.

When the effects of the temporal tap cannot be elicited, it is necessary to examine the temporalis muscle. To determine if the temporalis muscle is involved, the posterior fibers can be therapy localized; if positive, the usual approach of muscle spindle cell therapy for muscle weakening is administered (see page 146). After effectively correcting the temporalis muscle function, the temporal tap should be effective.

Use of Positive and Negative Statements

The temporal tap can temporarily influence several types of body function. This is of value for limited influence on certain types of physiologic functions. The mechanism can be demonstrated on a skeletal muscle. When the mechanics and sensory input are correct, it can cause a previously strong muscle to weaken, or a weak muscle to strengthen in most cases. Strengthening of a weak muscle is usually only temporary, because there is a basic underlying cause for the weakness which has not been corrected.

Primarily for illustrative purposes, we will discuss the temporal tap's effect of causing a normally functioning muscle to weaken temporarily on manual muscle testing. Verbalization must be different when administering the temporal tap to the right and left sides of the skull. If the doctor is tapping the patient's left temporal sphenoidal line, the statement must be positive, such as, "Your leg muscle is weak." When tapping the right side, a negative statement such as "There is no need for strength in your leg muscle" is presented. The "no need" is negative, and the wording is

important. Upon administering this sensory input, there will be an immediate weakening of the muscle indicated when it is tested by manual muscle testing. The length of time that the muscle remains weak will vary with different individuals. It will usually last for at least thirty to sixty seconds, which is a general impression depending on the number of times the muscle is tested. In some individuals it seems to last up to several minutes.

The question immediately arises as to whether the muscle weakness is simply a result of the suggestion given to the patient. Nearly all individuals are susceptible to suggestion — some more so than others. However, the evidence indicates that in most cases the effects of the temporal tap are from the tap itself. When it is administered incorrectly, such as a negative suggestion given to the left side and positive to the right in a normally organized individual, there will be no effect in most subjects. Of course, there are some who are very susceptible to suggestion, and there will be a positive reaction regardless of the approach used. As has been mentioned, some doctors have a high level of influence over their patients, and their ability to give suggestions which will influence the patient is strong. When some of these physicians use the temporal tap, the suggestion is followed regardless of the mechanics used in the tapping procedure.

Sensory input in the form of a suggestion must be understood by the patient. The statement, "Your leg muscle is weak" is understood by the subject and is applied to the leg being tested. A statement such as, "There is no need for your tensor fascia lata to be strong" will not be understood by most people, and will produce variable results. The message can be given in a written form, and the subject can read it while the temporal tap is being done.

The temporal tap is done in various ways, depending upon the person doing it. Some do it immediately before the suggestion; some while the suggestion is given; others temporal tap after the suggestion has been made. Any, or a combination of these approaches, is effective with varying degrees of results. The temporal tap is effective if the suggestion is given while tapping only one side of the head; however, it is more effective when the suggestion is given twice, in its positive and negative forms, while tapping the appropriate side of the head.

Control of Involuntary Actions

Use of the temporal tap to control involuntary actions of the body has been very interesting. It has been most significant in dentists' use[10] to control the gag reflex, salivation, and bleeding during surgery. The gag reflex can be reduced in an individual who has excessive activity of the reflex. This is particularly interesting to the dentist taking an impression or performing certain x-ray procedures. The patient is temporal tapped on the left side with the sensory input, "You will get along fine without gagging" repeated several times. On the right, the input is, "There is no need for you to gag." After the temporal tap, the gag reflex will usually be reduced, it appears by approximately 90%. The temporal tap can be done prior to taking the impressions or doing other procedures, or it can be done during the procedure if the patient starts to gag.

This effect can be demonstrated by stimulating the posterior soft palate to cause gagging, both before and after the temporal tap procedure. When lecturing, this is a common demonstration of the use of temporal tap. It is dramatic when an individual highly susceptible to gagging violently retches prior to the temporal tap, then afterward tolerates significant stimulation with a tongue blade or some such device.

Dentists have also reported very effective results using the temporal tap to control bleeding during oral surgery, crown preparation, and in controlling excessive salivation. Early attempts to utilize the temporal tap for these purposes were unsuccessful. The sensory input was, "You will get along fine without bleeding" for the left side, and "There is no need to bleed" for the right. Changing the sensory input to "You will get along fine without as much bleeding" (or salivation) for the left, and "There is no need to bleed so much" for the right, was successful in significantly reducing bleeding or salivation. As pointed out before, the sensory input must be one that is acceptable to the patient's mind. The mind apparently knows that when surgery is being done, it is not good for bleeding to stop completely; hence the poor effects of the first statement. When the statement was changed to indicate that not as much bleeding was necessary, the mind accepted that input and changed the bleeding.

The control of involuntary activities, such as the gag reflex, bleeding, and salivation, gives evidence that the temporal tap is effective for entering suggestions into the nervous system which help bring involuntary activities under control. The effects of the temporal tap are not permanent, usually lasting a half hour or so in the control of involuntary actions. In other words, this approach does not take the place of therapeutics which bring the regulating systems of blood pressure, circulation, digestive function, etc., under control. However, it is an effective measure to temporarily influence an involuntary act that is compatible with the body's needs.

Habit Change

The temporal tap has been successfully used to help individuals eliminate problematic habits — **if** the subject desires the change. It has been used to help stop smoking, control excessive drinking, diminish unrealistic fears, control drug use, etc. As illustrated with the balloon experiment (page 110), we perceive what previous experience has taught us to understand.

The temporal tap is incapable of overcoming what an individual believes to be true. If an individual has made numerous attempts to control his alcoholism with no success, his belief will be that it is impossible to stop drinking. For the temporal tap to be effective in this type of habit change, there must be additional supportive activity to change the individual's basic belief. The doctor specializing in natural health care has an additional understanding of the relationship of the adrenal gland, nutrition and nutritional absorption, and other factors contributing to the alcoholic's problem. When the doctor explains the additional supportive factors to the patient, it helps him develop a new belief that success may be possible. In this case, the temporal tap is significantly supportive to the effort.

The mechanics of using the temporal tap for habit change are the same as for other uses. A positive statement is administered to the left side, while either the doctor or the patient taps. Remember — it is necessary for the doctor to use the palmar surface of his right fingertips on the left side of the patient's head, or for the patient to use the palmar surface of his left fingertips on the left side. For the right, the doctor uses the palmar surface of his left fingertips and the patient uses the palmar surface of the right. If for some reason the opposite hand from that indicated above is to be used, the dorsal surface or knuckles are used. For stopping a habit, the sensory input for the left side of a normally organized individual is, "You (I) will get along fine without smoking"; for the right side, "There is no need to smoke." The patient repeats the temporal tap whenever there is a desire to smoke, or indulge in whatever habit is being eliminated. The patient must have a desire to break the habit, and he must be capable of believing that it can be accomplished.

Audit Mechanism

The temporal tap appears to be an effective mechanism for auditing to determine if all factors of the IVF associated with a particular muscle-organ/gland weakness have been corrected. This is a significant time saver in the busy doctor's office, and — at least on an initial basis — it helps to assure that all factors of the IVF have been corrected. When a muscle is found weak in the clear and is strengthened with a reflex, such as the neurolymphatic, the muscle can be further tested by use of the temporal tap. First, the patient therapy localizes to the neurolymphatic reflex just treated, and the associated muscle is tested. If it weakens, there is indication that the reflex has not been adequately treated. If there is no weakening, then the doctor can temporal tap, using his right fingertips (palmar surface) on the patient's left temporal sphenoidal line. If the associated muscle again weakens after temporal tapping, there is indication that another factor of the IVF is still involved; it must be found and treated. There is no need to give a verbal sensory input; in this case the therapy localization appears to be providing it. This is continued until therapy localization to one of the factors of the IVF can be accomplished while temporal tapping and the associated muscle remains strong.

Although the temporal tap seems to be an effective audit mechanism for the five factors of the IVF influencing a specific muscle-organ/gland association, it must be remembered that there is considerable interplay between factors such as vertebral subluxations, cranial faults, etc. In more complicated cases, there may be an involvement that is giving inappropriate signaling, influencing the muscle-organ/gland association being evaluated; however, because it is not a direct influence, the temporal tap audit may not reveal the problem. The temporal tap audit is effective in the initial care of an individual, but if a disturbed control of energy pattern continues to return, the entire complex needs to be re-evaluated even though temporal tap audit may be negative.

Nutritional Need Indication

The temporal tap audit can also be used to determine if nutritional supplementation is needed. Have the patient therapy localize to any two indicators of the five factors of the IVF. It is best to choose two indicators from the neurolymphatic reflex, neurovascular reflex, or meridian alarm point, since the level of vertebral involvement and type of cranial fault vary so that it is difficult to get an adequate therapy localization. While the patient gives sensory input by therapy localizing these two factors, the examiner temporal taps the left TS line, similar to auditing for the five factors of the IVF. A previously strong indicator muscle is tested for weakening; if it does, this is indication that nutritional supplementation is needed. Have the patient chew an appropriate nutritional factor, and re-test with double therapy localization and temporal tap. Continue until the appropriate nutrition is found which cancels the test. Of course, before therapy localizing two factors of the IVF for the nutritional test, it is necessary to ascertain that all five factors of the IVF are functioning normally. For example, if there is positive therapy localization to the alarm point of a meridian, meridian imbalance is indicated and must be corrected first. All factors must be clear as indicated by therapy localization and by single-hand therapy localization with temporal tap audit before the nutritional audit can be used.

Therapeutic Enhancement

Temporal tap augments therapeutic processes. For example, an individual can be placed on the DeJarnette pelvic blocks to correct a category I or II, and then temporal tapped. The temporal tapping is done on the patient's left temporal sphenoidal line with the doctor's right fingertips, palmar surface. There is no sensory input in the form of a verbal suggestion, etc. The sensory input appears to come from the mechanical stimulation of receptors resulting from the torque position of the pelvis created by the pelvic blocks. In most cases, the pelvic correction will be obtained immediately.

MISCELLANEOUS INNATE ORGANIZATION

There are several types of organization present on an innate basis which apparently have significance. They have not been thoroughly studied, and the reason for their presence is not completely understood. Some of these have clinical value as diagnostic indicators in applied kinesiology. They are discussed here because they are an organized part of body function, and thus should fit into total organization, as will be evaluated later. If they do not, there is indication of disorganization, the type of which must be determined to make the examination complete.

Temporal Sphenoidal Line

The points on the temporal sphenoidal line (described on page 39) have organization with the spinal column. Note that the lower horizontal line relates with 8-12 thoracic vertebrae; the vertical line with 1-5 lumbars; and the top

horizontal line with the 2nd through 7th thoracic vertebrae. When an involvement is indicated on the TS line, there is usually a corresponding involvement of the muscle indicated by the point. There are two ways in which disorganization appears.

Sometimes the TS line indicates an involvement of a specific muscle or muscles, but testing does not show it to be dysfunctioning. As additional knowledge has been gained in applied kinesiology, it has been found that when indicated there is nearly always an imbalance in the neuronal pools, no matter how mild. This may be uncovered by control of as many variable inputs as possible and is done with special techniques. The motor pool is a balance of all the inputs, whether they be positive or negative. The TS line indicator of a muscle involvement in the absence of the muscle weakness is clinically valuable. There are many back-up mechanisms within the body that can return a muscle weakness to apparently normal function, giving the clinician problems in finding the basic underlying cause. When an inconsistency is shown by a positive TS line point and an associated muscle(s) fails to confirm the indication, further evaluation using specialized techniques to uncover "hidden" problems as presented throughout these texts should be made. There are patients who fail to respond adequately, simply because the body is hiding the underlying malfunction.

The other lack of correlation found with the TS line and body function is more important to this discussion. There are occasions when a TS line point indicates muscular involvement; upon testing, the involvement is found on the opposite side of the body. When this situation is present, the body is in a confused state of organization which demands further evaluation. The body's innate organization should be dependable and predictable. When it is not found that way, dysfunction known as "switching" is indicated (see Chapter 9).

Occipital and Trapezius Lines

DeJarnette[7] describes three lines on the posterior occiput which develop fibers appearing to correlate with spinal dysfunction. He has also described similar fibers along the upper trapezius, which complement his #2 occipital line fibers. If these palpatory indices do not correlate, there is either an error in the examination or confusion in body function. The use of these indicators and others that DeJarnette has developed appears to be valuable. Their study, along with other sacro occipital technique procedures, is recommended.

Skin Reflexes

There are points in the skin which clinically appear to correlate with specific functions, organs, and muscles. This association is not well understood; it may have developed because the nervous system and skin are both derived from ectodermal tissue, and have apparent association from the time of conception on through the development of the fetus.

Montagu[26] discusses the importance of the skin as a major organ of the body. He relates an experiment conducted at the University of Notre Dame, in which animals taken from their mothers to be raised in a germ-free environment died as a result of functional failure of the genital, urinary, and gastrointestinal tracts. It was found that rats, mice, rabbits, and other mammals depending upon the mother for sustenance in the early days of life have to be stimulated at the perineal region to start defecation and urination. The laboratory experiment was continued, with the genitals of the young being stroked hourly with a wisp of cotton. After the stimulation, there was no further problem with failure of genital, urinary, and gastrointestinal function.

Montagu continues with many instances of physiologic and functional disturbance resulting from lack of skin stimulation and gentling of the animal, including humans. Skin reflexes are better understood as the result of relatively recent electrophysiologic studies, which are discussed in Chapter 12.

There is a considerable amount of clinical evidence of an innate organization of reflex association with specific muscles, organs, and glands. Knowledge of this organization is of value because there is sometimes a lack of correlative activity, indicating a neurologic disorganization requiring further investigation. Procedures utilized in applied kinesiology appear to allow the investigator to unravel the disagreement in indicators, and permit observation of the patterns so organization can be returned.

Meridian System

The meridian system of acupuncture usage has not received much investigation by western scientific methods. There has been some discussion in this text about the meridian system and its correlation to the triad of health and body language. It serves to mention here only that the meridian system has an apparent organization with muscles, organs, and glands as observed in applied kinesiology. This organization should be predictable; when it is not, there is evidence of disorganization in the body which should be evaluated and corrected before further evaluation and treatment are continued.

Proprioceptive System

The proprioceptive system has some organization at birth which continues to develop, especially through the formative stages in the infant and young child. Activities of this aspect of the nervous system should also be dependable and predictable. If the inherent aspects of the proprioceptive mechanisms are not functioning appropriately, as observed on manual muscle testing, there should be evaluation for disorganization within the body's mechanisms. If there is evidence that certain aspects of the proprioceptive system have failed to develop adequately or have been altered, training procedures for this development may be necessary. The evaluation and correction of the various aspects of the proprioceptive system are presented later in this text.

Developed Organization

Many neurologic activities are organized from birth throughout life. It appears that sometimes the activity is genetic, present at birth and organized to a higher level of efficiency. In other instances, there may be the development of new organization which is not inborn in nature. This section discusses some of the developmental processes and how there may be interference with proper organization. If there is lack of organizational development, or it develops in an improper manner, procedures should be utilized to re-train the body so that it can organize in a normal manner. Such techniques are commonly known as proprioceptive neuromuscular facilitation (PNF).

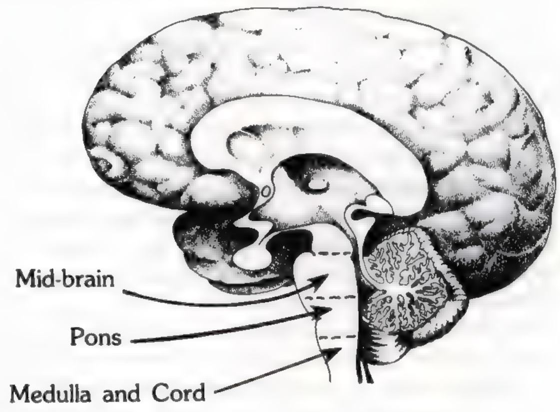
Releasing the body to organize in a normal manner is the usual procedure attempted in applied kinesiology. It must be recognized, however, that organization sometimes fails to develop. It is then necessary to use appropriate procedures to initiate the education of the body for proper organization.

It appears that the specialty for each hemisphere of the brain is genetically determined. This would give an assignment for specific dominancy of each side of the body. The dominancy should be organized throughout the body for best function.

Doman and Delacato[8] presented a working hypothesis on the development of the nervous system through bilateral function and final dominancy. Their application was to individuals with speech and reading problems, as well as other types of learning disabilities and functional neurologic problems. In many instances, the evaluation and treatment procedures extended to children who had been diagnosed as having minimal brain damage. The concepts presented by Doman and Delacato were actively pursued in the field of education and rehabilitation in the 1960s, with many excellent results. There are those in the field of education who now downgrade the importance of their work. Certainly, it is not a panacea for all reading, speech, and learning difficulties, but their concepts provide much food for thought and correlative findings with those of applied kinesiology.

Diagnostic methods as described by Doman and Delacato may, in some instances, indicate a program of crawling and creeping; applied kinesiology examination and findings may point to some other mechanism interfering with the normal expression of properly developed neurologic correlation. In these cases, removal of the interfering mechanism allows restoration of normal body function without the necessity of crawling and creeping educational procedures. This may shed light on why some individuals who seemed to need Doman and Delacato's therapeutic approach did not respond adequately to the procedures; there was some other aspect interfering with normal function which had not been found and corrected.

Delacato reports the hypothesis that the child goes through five stages of development, beginning with the lower spinal cord and medulla oblongata reflexes which are present at birth, to approximately sixteen weeks. Next, homolateral function of the visual and auditory mechanisms develops during the pons level at sixteen weeks to six months. Then from six months to one year, the mid-brain develops, providing for the cross pattern mechanism and using both sides of the body together. This is an important area of development which prepares the child for function in an upright position. Early cortical function develops in the age range of one to five years. During this stage, there is continued bilateral development, and walking begins. Finally, from three to eight years, cortical hemispheric dominance develops, giving right- or left-handedness and continued neurologic organization.



8—6.

Delacato compares this progression to the phylogeny or evolutionary development of man. At the spinal cord-medulla oblongata level of development, the child has the autonomic, innate functions necessary to life. He has movement and muscle tone, but no purposeful mobility; any mobility present is undulating and fish-like in character.

At about sixteen weeks, the child develops from the medulla oblongata stage to the pons. Here he goes into an amphibian-like level. Mobility is obtained by homolateral action of the legs and arms, while the trunk remains in contact with the floor. The arm and leg on the same side of the body extend and flex together to obtain movement. The tonic neck reflex is present to about twenty weeks of age. Sight and sound become important to the child, but his eyes and ears are not organized to function together. Instead they are used independently, unable to locate sounds and have efficient depth perception.

At about six months of age, the child develops into the mid-brain stage. Now he leaves the amphibian level and develops as a true quadriped. At this time, a cross pattern crawl develops, with the mid-brain being the area of mediation and integration. "Cross pattern" means he moves his arm and leg in flexion on opposite sides, while the other arm and leg are going into extension. The child now begins to use the two sides of the body together, as exemplified by the crawling. His eyes and ears begin to function together; he is able to coordinate the hand with the eye, and begins to place sound in space.*

*It must be pointed out that the term "crawling" in applied kinesiology refers to moving across the floor on hands and knees in a quadriped fashion. Delacato refers to this action as "creeping." Crawling in Delacato's definition refers to moving along the floor with the body remaining in contact with the floor. Propulsive movements are made in a homolateral fashion typical of the amphibian.

Early cortical function begins at about one year of age. Bilateral use is becoming increasingly efficient. At this stage, the child begins to pull up on furniture and take his first few steps in becoming a biped. His arms do not function in a cross pattern, but rather as balancing staffs. The use of the two sides in walking becomes more efficient as this stage develops. The child's vision and hearing become more bilateral, giving better depth and placement in space perception. According to the hypothesis, early cortical function should not begin until there is fairly efficient bilateral function. Entering this stage too soon seems to retard bilateral function from developing the efficiency needed.

Intrauterine — 16 weeks

Spinal cord and medulla oblongata, reflex actions only.

16 weeks — 6 months

Pons. Homolateral activity of visual and auditory functions.

6 months — 1 year

Mid-brain. Cross pattern, quadriped crawling, development of using both sides of the body together, important area of development to prepare child for upright position.

1 year — 5 years

Early cortical function, walking, and continued bilateral development.

3 years — 8 years

Cortical hemispheric dominance; develops right or left dominance and continued neurologic organization.

Cortical hemispheric dominance begins to develop at about three years of age. There is a hereditary factor in the choice of dominance;[8] right-sided parents are apt to give birth to right-sided children. If a twinning genetic tendency is present, the child is more apt to be left-sided. Dominancy usually begins with hand choice, followed by eye, foot, and ear dominancy. The one-sided dominancy is unique in man. It usually is fully developed by the age of five to eight years.

This description of development can be correlated with MacLean's triune concept of the brain and behavior.[24] He describes three cerebrotypes, which intermesh and function together as a triune brain. He names these the "R-complex" (reptilian brain), paleomammalian, and neomammalian. Although they function together, they have the capacity for operating somewhat independently. MacLean states that ". . . the word 'triune' (was selected) because it has the advantage of implying that the whole is greater than the sum of its parts, because the exchange of information among the three brain types means that each derives a greater amount of information than if it were operating alone." The beginning of man's brain is basically reptilian, forming the matrix of the upper brain stem and comprising much of the reticular system, mid-brain, and basal ganglia. The paleomammilian brain corresponds to the limbic cortex, and is closely involved with oral and sexual functions required for self-preservation and the preservation of the species. Part of the limbic cortex receives visual connections and has connections to areas involved in emotional, endocrine, and somatovisceral functions. It appears that there is a complex organization of the old and the new structures involved in insight and foresight in planning for ourselves and others. Finally, the neomammalian brain appears in late evolution and is the more complicated type of cortex, which is the cerebral hallmark of higher mammals and culminates in man to become the brain of reading, writing, and arithmetic. For complete references and a transcript of MacLean's presentation at the Hincks Memorial Lectures, refer to the original reference. Restak[30] presents a descriptive synopsis of MacLean's work.

Doman and Delacato's original work for their hypothesis attributed the cause of conditions such as dyslexia, stuttering, and other problems correlating with neurologic disorganization to lack of adequate development through the stages of organization. After diagnosing the stage where development did not take place, the treatment was to regress the individual to that stage of development, and develop or re-train by patterning procedures the organization previously neglected.

The application of this hypothesis has been valuable in applied kinesiology. It was one of the first therapeutic applications to re-organize neurologic function which seemed to be in a confused state. The therapeutic procedure of "cross crawl" (described next) was routinely applied when there was evidence of alteration or substitution of normal neurologic mechanisms. As more knowledge has been developed in applied kinesiology, cross crawl patterning is used less often as a therapeutic measure. It is now used only when there is evidence of lack of development of organization, or when supportive measures are needed to help maintain a particular correction. With the growth of knowledge in applied kinesiology, re-organizing nerve function in the body has become easier and more rapid, requiring fewer and fewer treatments for the patient.

The child's development through various stages can encounter interference in many forms. Failure could result from some type of brain injury, severe febrile disease, or any disease process interfering with normal nerve function. Trauma, such as a fractured leg, joint injury, etc., that interferes with normal activity can retard development. This is especially true if the timing of the trauma coincides with a major change taking place in organization. This can limit some very important activity. If a child who has learned to crawl is injured, he may not have developed adequate bilateral function before the first stages of walking will be attempted. Age and physical development may be ready for walking, but the nervous system is not.

Perhaps one of the most common types of interference with normal development is that which comes from adults. Restriction of the child's movement is a frequent cause of inadequate development through the different stages. This can be from clothing, such as heavily padded diapers, and

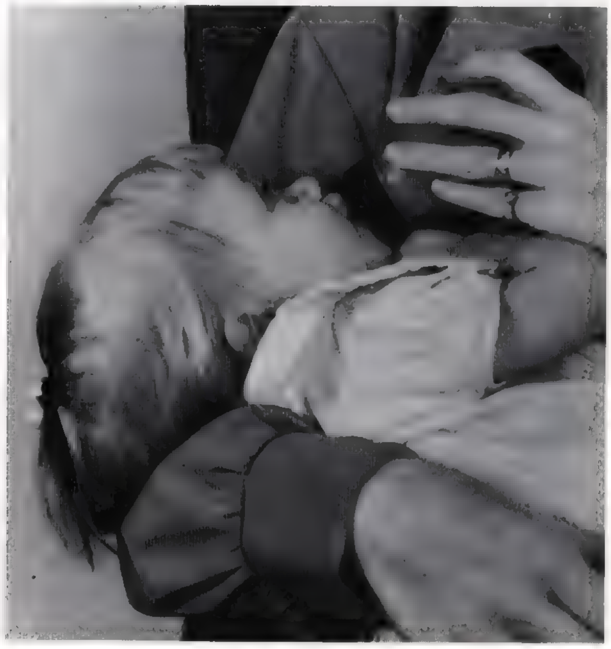
even shoes. There is indication that the proprioceptors of the toes and ankles develop some integration during the child's crawling stage. High-topped, tight shoes restrict the activity of the ankle and bones of the foot. Children may be restricted when adults tie them into plastic infants' seats, or put them in playpens or in walkers. The walker especially appears to be a problem because it not only restricts the child from crawling, it also encourages him to walk prior to the development of adequate bilateral use of the body.

8—7. Normal cross crawling of child develops bilaterality.

The manner in which a child is handled also has a bearing on bilateral development. This is especially true regarding the mother's activity, because she is usually the child's controlling factor. Normally, when a child is breast-feeding, one eye and arm are restricted alternately as the mother uses the opposite breast on subsequent feedings. The bottle-fed baby is too often held on the left arm and fed with the mother's right hand as a convenience to the right-handed mother. This feeding in the same direction does not give the baby a chance to develop both sides for good bilateral integration. A bottle-fed baby should be held by the mother in alternating arms from feeding to feeding.

There is a tendency for adults to force a child to develop too rapidly. The speed of development through these early years is already a marvelous accomplishment. The reason for the parents' effort to speed the process even more is probably the desire to have a "smart, accomplished" child. Ironically, forcing new activities for which the child is not neurologically prepared disturbs organization, and in many instances may actually cause the child to eventually be inefficiently integrated.

When the baby begins eating solid food, an adult tends to put him in a restrictive highchair and give him an eating utensil, such as a spoon, when he should actually be functioning bilaterally. During the development of the mid-brain in the early cortical stage, the child should be eating with both hands to enhance the organization of the two sides together, which is necessary at this stage of development. Using a spoon forces the child into unilateral dominance before he is ready.



8—8. Continuously holding child in same position restricts the use of the limbs and eyes bilaterally. The child should be held alternately in the right and left arms from feeding to feeding.

8—9. Use of eating utensils begins development of unilaterality and dominance. Observe that this child's eyes are not functioning together, an indication that bilaterality has not yet been developed. The child is not ready for unilateral and dominance development.

Children develop at different rates. It is our opinion that they should be allowed to go through the stages of development at their own pace, unrestricted. Forced development is frequently seen in the parent teaching the child to walk. Observe this early activity, and you will often see a

child who has no desire to move his legs; yet the parent will move the child's legs, attempting the walking action. Indication that a child is ready to begin walking is seen when he begins pulling up to a standing position around a coffee table or some other stationary object. After accomplishing this bipedal activity, he will eventually begin walking around the coffee table while using it for support.

During an applied kinesiology examination that indicates failure of proper developmental organization, a common factor in the patient's history is the effort of a parent to change the child from a left to a right hand dominancy. If the child is genetically organized for left hand dominancy, he should be allowed to develop in that manner. Ideally, if a parent observes a child developing left dominancy, the child should be examined by a person knowledgeable about specialty of the right and left hemispheres of the brain to determine if the child is genetically pre-determined to be left hand dominant. If so, he should be allowed to develop that way.** If there is evidence that the child is genetically programmed for right hand dominancy, whatever neurologic disorganization has developed should be found and corrected, and the child allowed to develop as right hand dominant. Although this seems to be the optimum approach for dealing with apparent left hand dominancy, most people presented with this problem are not aware of the specialization of the two hemispheres of the brain.

If an individual is genetically left hand dominant, or has developed as left hand dominant, he is more likely to experience problems with neurologic disorganization. It is very difficult for the left hand dominant person to live in the right dominant world. Since the vast majority of individuals are right side dominant, most tools, furniture, sporting equipment, etc., are designed for those persons. Delacato indicates that mirror writing is fifteen times more common among left-handed children than among those who are right-handed. There is also a significantly larger number of stutterers and poor readers who are left dominant.

**Determining whether the child should be right or left dominant can be accomplished by use of temporal tap techniques described on page 112. If the child is very young, applied kinesiology pediatric techniques can be used and are described in Volume V.

8—10. Children should not be forced into early walking.

8—11. When the child is ready to start walking he will first pull himself up into a biped position, then begin taking steps on his own.

EXAMINATION FOR STAGES OF NEUROLOGIC ORGANIZATION DEVELOPMENT

In applied kinesiology's use of Doman and Delacato's hypothesis of neurologic organization, it is not necessary to specifically diagnose whether the individual's development was inhibited at the cord and medulla, pons, midbrain, early cortex, or cortical hemispheric dominance level. However, it **is** necessary to determine if the individual has developed organization and then substituted abnormal patterns as a result of trauma, or whether organization failed to develop in the first place. It is necessary to evaluate the individual in the Doman and Delacato manner described here, as well as to correlate other applied kinesiology examination procedures presented throughout the rest of Section I of this text.

A history of the individual's neurologic organization, especially during childhood and the formal educational period, is important. If there was lack of organization because of interference with childhood development, the symptomatic pattern of disorganization will usually have been present throughout the child's educational period. It would also have manifested itself in sports and other skilled activities. The history should delve into the individual's genetic background, looking for neurologic disorganization or for left-handed or ambidextrous family members. Although the patient often cannot answer these questions, there is value in attempting to determine if there was trauma, disease, or restriction of activity during the stages

when significant neurologic development — e.g., crawling — should have been taking place. Many times the patient will deny knowledge of such incidents, but will relate some significant factor on the next visit, having discussed the subject with his parents.

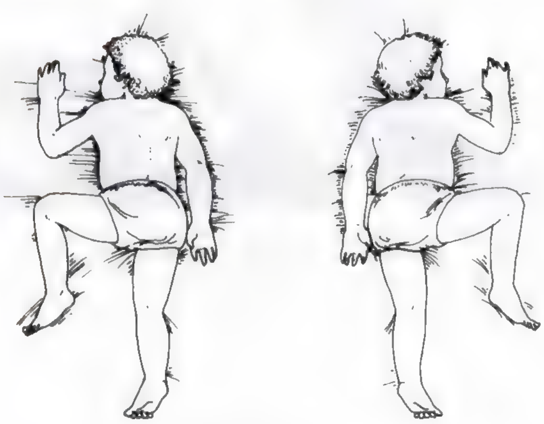
Examination is done by having the individual perform activities which should have developed in the different stages. The system Delacato[9] uses will be discussed here, together with findings which have arisen from clinical trials in applied kinesiology for evaluation by manual muscle testing.

Cord and Medulla Level

Failure of development at this stage is rarely observed in a clinical applied kinesiology practice. Standard neurologic examination is performed to rule out any deficit in this area.

Pons Level

The tonic neck reflex is a function of the pons, and can be evaluated while the child is asleep. Children who are well-organized at this level sleep in a prone, homolateral pattern position. A child genetically patterned for right-handed dominancy, sleeping in the prone position, sleeps with his left arm and leg flexed and his head turned toward the left. His right arm and leg are in a neutral extended position. The child genetically organized for left-handed dominancy sleeps with his right arm and leg flexed, and his head turned toward the right. His left arm and leg are extended. Although the sleeping patterns will vary from



8—12. Sleeping position for a genetically determined right-hand dominancy.

8—13. Sleeping position for genetically determined left-hand dominancy.

time to time, frequent observation of the appropriate pattern should provide evidence of good organization at the pons level. When a child does not sleep in the indicated position, further evaluation can be done by turning his head during sleep. If the child shows no reaction when his head is turned, there is evidence of reduced tonic neck reflex activity at the pons level. The expected reaction is for the child to wake and turn his head back to its original position, or change his body configuration to fit the head turn.

The child should accurately turn toward a human voice and should be visually able to pursue an object without an alternating strabismus. Vision is evaluated, one eye at a time, using the cover test. The child is asked to follow an object with one eye while the other eye is covered. The object should be followed with smooth eye movement.

Mid-brain Level

It is at this level that most dysfunction is found when evaluating with Delacato's method, and also with applied kinesiology manual muscle testing. Delacato evaluates the individual's ability to move across the floor on his hands and knees in a quadriped fashion. He calls this action "creeping"; in applied kinesiology, the action is known as "crawling." Delacato evaluates to determine if the activity is smooth and rhythmic. It should be in cross pattern, with the right hand and left knee striking the floor simultaneously; in the next phase, the left hand and right knee should strike the floor simultaneously. The hand should be palm down and flat, and the fingers should point straight ahead. The following questions should be answered in the affirmative: (1) Is it the proper pattern? (2) Is the rhythm good? (3) Are the hands and fingers in the proper positions? (4) Do the feet drag along the floor?

The mid-brain level is usually evaluated by applied kinesiology methods which give an added dimension. If the individual being evaluated is young and incapable of co-operating with applied kinesiology procedures, he can be tested by Delacato's method which proves to correlate with applied kinesiology. There are special pediatric methods for testing in applied kinesiology (Volume V) which can be used if necessary. Most individuals being tested for the ability to effectively function at the mid-brain level are old enough to cooperate with the usual applied kinesiology testing procedures.

Cross pattern activity is evaluated in applied kinesiology by having the patient do a therapeutic trial, then evaluating any change of muscle function. This is discussed more thoroughly in the section on cross crawl evaluation.

Effectiveness of bilateral visual function is evaluated by Delacato by giving the individual an object to hold in his hand. The patient is expected to move the object at arm's length in all axes; the smoothness of eye function in following the object is used as an indicator for mid-brain function. This enables the examiner to determine how well the individual is developed for bilateral coordination of eye/hand movement.

In applied kinesiology, bilateral function of the eyes is evaluated by testing for "ocular lock." This is done by having the individual look in all visual fields — right and left, up and down, and at various angles in between these directions. While the eyes are held in one of these positions, a previously strong indicator muscle is tested for weakening. If bilateral organization is poor, weakening of the indicator muscle will be perceived on manual muscle testing. A positive test in any one of the directions has become known in AK as "ocular lock."

Another method for evaluating for ocular lock is to have the patient follow the examiner's finger in a circle large enough to cause the eyes to go through their full

range of motion. After the circle is completed, the examiner tests a previously strong indicator muscle. When effective bilateral coordination of eye motion is not present the muscle will weaken on manual muscle testing.

Evidence of ocular lock by either AK method suggests that there is poor organization at the mid-brain level. However, there are numerous other factors which could be the cause of the positive test. One of the most significant is cranial primary respiratory dysfunction, discussed in Volume II.

Early Cortex

The child should be walking in a cross pattern at this stage of development. As his right leg goes forward, his left arm should do likewise. The gait mechanism can be evaluated by exaggerating the gait, as Delacato does. The examiner demonstrates walking by exaggerating the cross pattern of normal walking. He steps forward with his right foot and points to it with his left hand. He then steps forward with his left foot, pointing to it with his right hand. The patient is asked to do the same thing. The examiner evaluates for a smooth, balanced pattern. Better coordination at this level is needed if the patient starts off using the leg and arm on the same side of the body at the same time, crosses his feet, or has an obvious lack of balance. Much starting and stopping before getting started is also indicative of poor organization. When this is present, the patient will frequently have great difficulty in understanding the task to be performed.

Visual observations are also made at this level as development of bilateral integration is continued. There should be an improved bilateral function of the eyes in following an object. Delacato observes for the eyes moving smoothly as they follow the examiner's hand in the cardinal positions of right and left, up and down, oblique and in a circle. Lack of organized eye motion in following the hand is consistently observed when applied kinesiology testing is positive. After the examiner has gained experience with this test, the result of the muscle test becomes predictable. Staggered eye movement during the test frequently coincides with a positive muscle test.

A considerable amount of information can be obtained if the examiner observes the patient walking or running in his usual pattern. Frequently a person walks in a normal cross pattern, but with the additional stress of running the pattern deteriorates, becoming out of phase. Unfortunately, when a patient is running it is difficult for the examiner to evaluate for adequate cross pattern, or the lack of it. In our practice we have evaluated many individuals with motion photography, both motion pictures and fast-action still photography. Interestingly, one patient who appeared to be running in a cross pattern was actually changing from a cross pattern to a homolateral pattern, and then back to a cross pattern. The examiner was unable to detect this change by simple observation. In comparing photographic evidence of changing patterns with the running pattern noted by the examiner, it was observed that it is much better to look for symmetry and smoothness of running. The individual who has an effective cross pattern throughout all gaits looks balanced, and seems to run easily. The individual with disorganization lacks trunk rhythm, his head appears to bob around, and his arms seem to flail about and do not have a consistent pattern of movement. As the patient becomes neurologically organized from applied kinesiology procedures or cross patterning activity, the running pattern improves as observed by photography.

The pictures on pages 122-123 show the running pattern while disorganized, and approximately two months later after organization has taken place. The first set shows evidence of the changing pattern and lack of body harmony; a significantly improved cross pattern and body harmony are displayed in the second set.

Cortical Hemispheric Dominance

The neurologically well-developed individual in this stage will have the same dominant eye, ear, hand, and foot. Dominance is considered to be that side which correlates with the verbal side of the brain. In most individuals, this will be the left side; consequently, the dominancy of the eye, ear, hand, and foot will be on the right. Mixed dominance, or failure of the dominancy to correlate with the verbal hemisphere of the brain, suggests poor development of cortical hemispheric dominancy. Earlier in applied kinesiology, there was little ability to balance dominancy when it was mixed or failed to correlate with the correct hemisphere of the brain. As more clinical experience has been gained, the organization of dominancy is becoming easier to accomplish in a higher percentage of individuals.

During examination for dominancy, the individual will be listed as right, left, or mixed. This will then be correlated with brain hemisphere function.

Hand dominance. Determining which hand is dominant is the easiest evaluation. In most instances, simply asking the adult if he is right- or left-handed is adequate. Care must be taken, however, to determine that the individual is not of mixed dominancy regarding handedness. Sometimes an individual will write with his right hand, but do sports activities, etc., with his left. He will usually tell the examiner; however, a conscious evaluation for it must be made.

When evaluating a child, it is often of value to ask the parent questions, or to have the patient imagine he is doing some activity. Delacato describes many observations that can be made easily in the office. The patient can be asked to write or draw with a crayon, throw a ball, pick up objects, do puzzles, pound with a hammer, cut with scissors, or play checkers. Activities not conducive to office evaluation can be imagined by the child. The examiner asks the child to show him how he eats, brushes his teeth, etc. When asked to cross the arms, the typical reaction is to place the dominant arm on top.[6] These activities are repeated several times. If the child consistently uses the same arm and hand, he is classified as dominant on that side. If there is alternate activity, the classification is mixed.

Foot dominance. The dominant foot is determined by observing which foot the individual uses in kicking and doing intricate activities. The capability of the feet can be observed by placing some marbles on the floor and having the individual pick them up and place them in a separate pile with his toes. The activity is evaluated for which foot is more accurate and faster in picking up the marbles. While

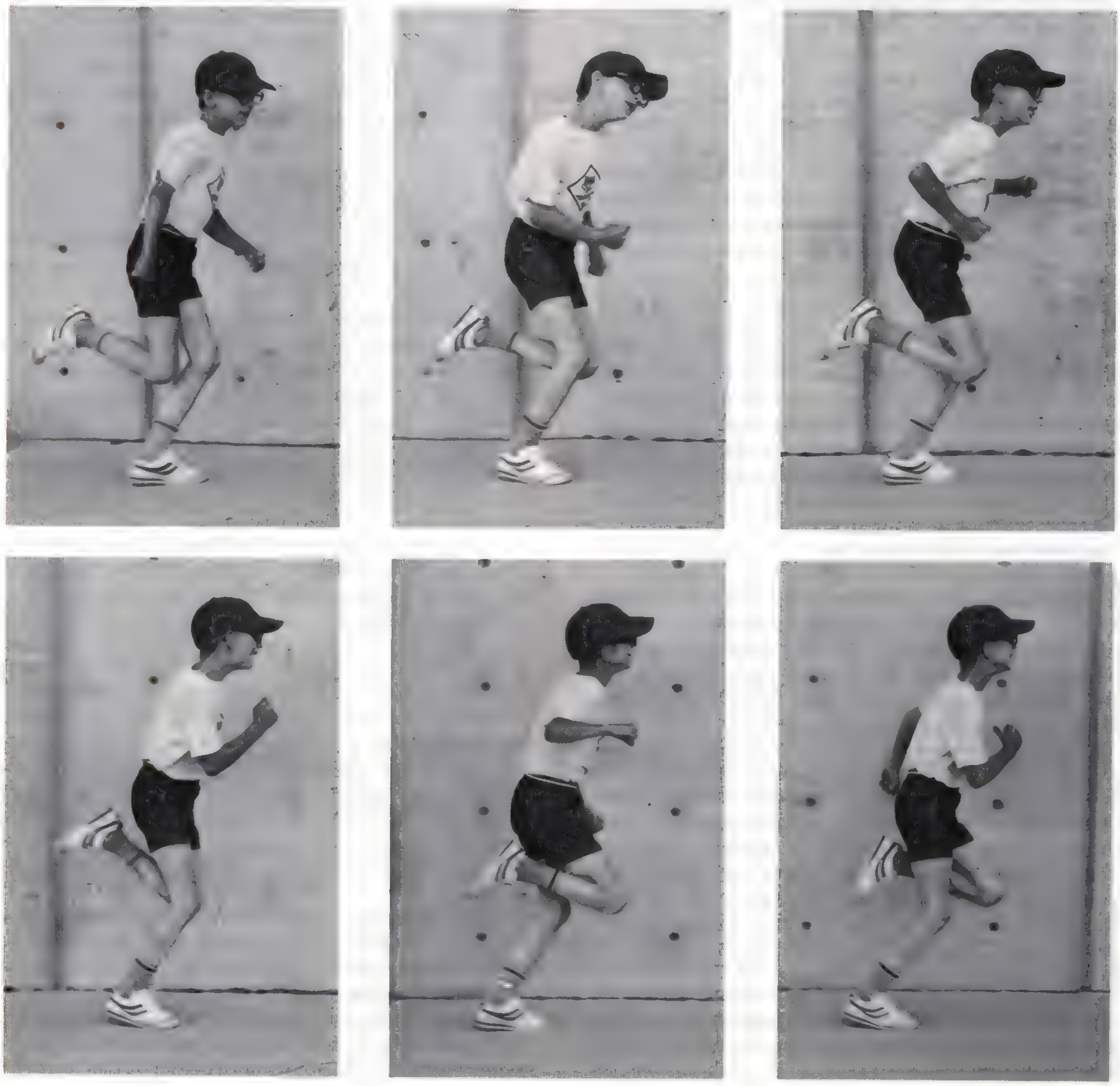
in this barefoot state, a pencil is placed between the toes and the individual is asked to write his name. The writing capability of the two feet is compared; the dominant foot will have better writing characteristics. Pedal dominance can also be observed by having the individual step up on a chair or step. Since approaching the object and then stepping on it may predetermine which foot is used, the individual should be placed directly in front of the object and the activity begun from a standing position. The individual will typically use his dominant foot to step on the object.[6]

Ear dominance. It is much more difficult to determine the dominant ear. One reason for the difficulty in making this determination is probably that there is not as significant a decussation of signals from hearing. Each side of the brain receives input from both ears. The crossed connections are stronger than the uncrossed ones.[21]

The usual clinical test is to give the child something with a clicking sound to listen to, such as a watch. The usual action is to place the watch to the dominant ear to listen. On the other hand, a musical instrument, such as a music box, will usually be held to the "non-dominant" ear. This makes sense with an understanding of bilateral brain function. The clicking sound is best interpreted by the logical, mathematical left brain in the average individual, while the musical sound is best interpreted by the tonal right brain.

Eye dominance. There are several methods for deter-

8—14. Running pattern when there is evidence of neurologic disorganization by Delacato and applied kinesiology methods. Not all individuals who have disorganization will have an imbalanced running pattern.

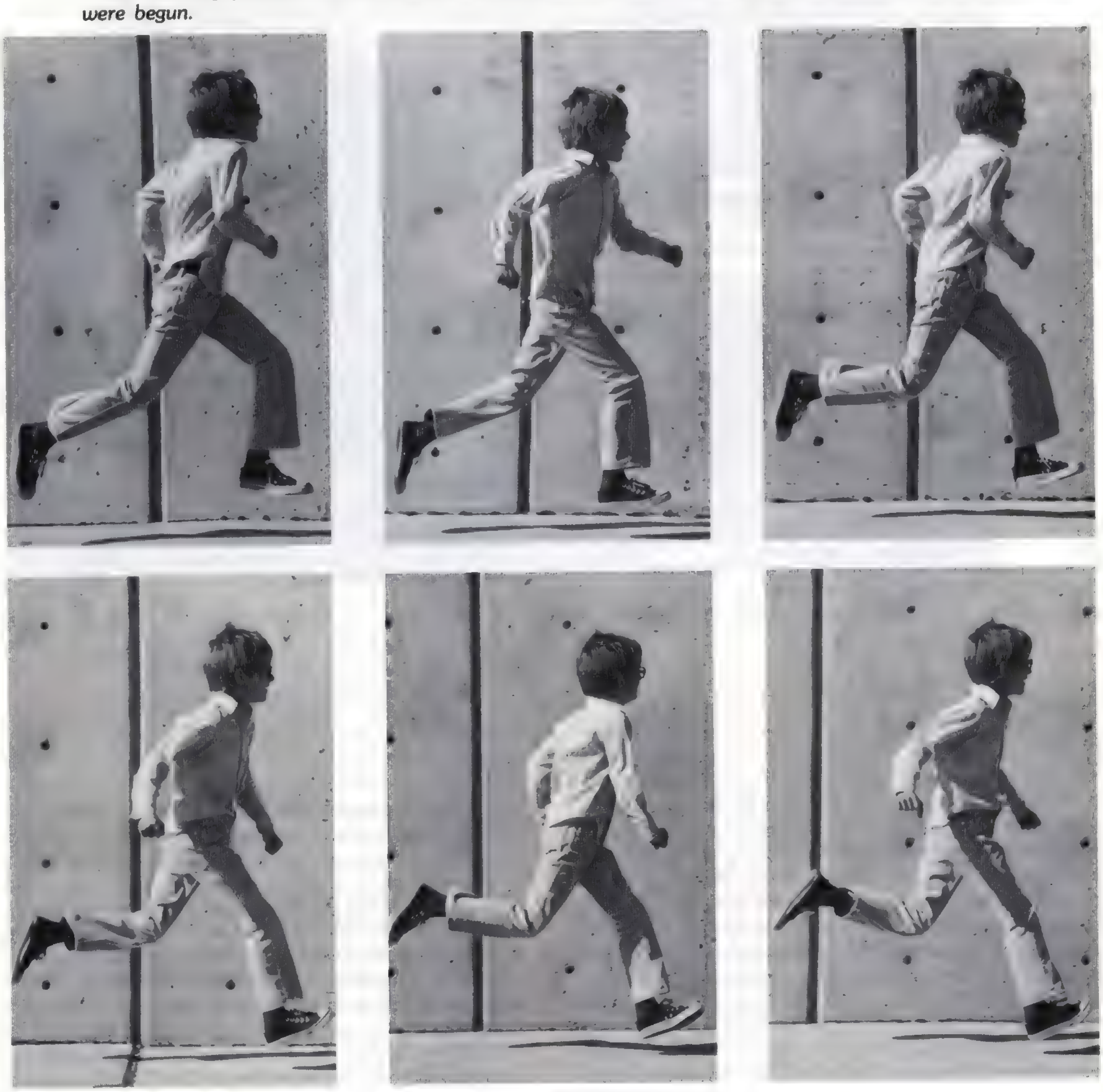


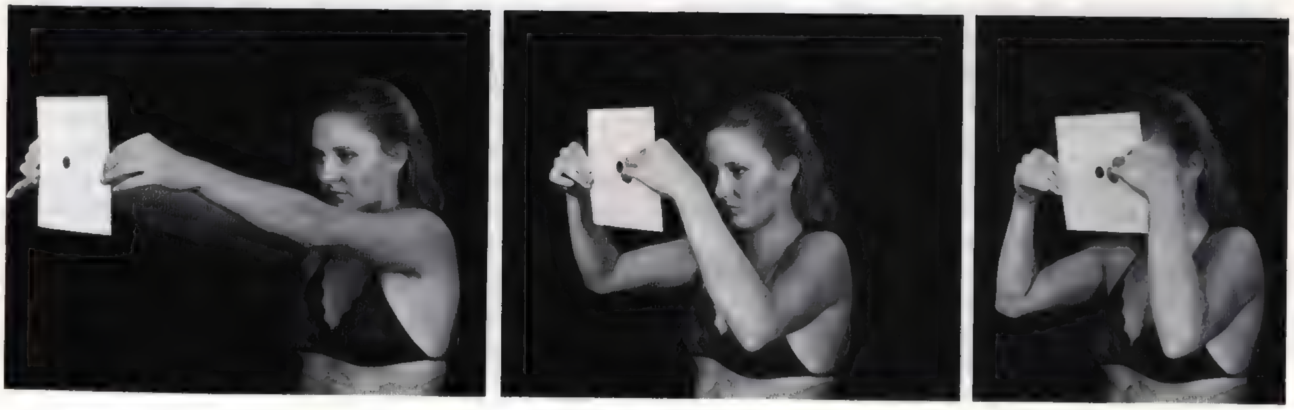
mining near- and far-point eye dominancy. To determine far-point binocular dominancy, give the individual a tube to hold in both hands at arm's length, and have him look at a distant target. The examiner observes which eye the individual uses in lining up the tube to observe the target. To create a monocular far-sighting test, give the individual a sheet of paper with a half-inch hole cut in it. The subject is asked to line up the distant target in the hole and bring the paper up to his face, maintaining visual contact with the target. The opening in the paper will be brought up to the dominant eye (8—16).

Evaluating near-point sighting is similar to that of far-point. The individual being tested is seated at a desk and given a three-to-five inch tube. On the desk is a sheet of paper with an "x" marked on it. He is asked to look at the "x" through the tube, and bring the tube slowly back to the eye without losing sight of the "x." The eye to which the tube is brought is the dominant eye.

Another method of doing near-point sighting is for the examiner to hold his finger approximately 36 inches from the patient's face. The patient is then asked to align his index finger with the examiner's finger. The patient's finger should be approximately half-way between the examiner's face and that of the patient. The patient's index finger will line up with the dominant eye. Each of these sighting tests should be done three times; it is best to alternate them so that a practice or habit pattern does not develop (8—17).

8—15. Running pattern of the same child approximately two months after corrective procedures were begun.





8—16. Monocular far-sighting test. Patient aligns opening in cardboard so target can be visualized, and then brings cardboard to the eye while maintaining sight of the target. Opening in cardboard will be brought to the dominant eye.

The examinations and hypotheses of Doman and Delacato presented here have significant value in helping understand the stages of neurologic disorganization in which an individual might be. As mentioned, sometimes neurologic organization failed to develop in the first place; at other times an injury, illness, pathology, etc., developed later in life and disturbed the function of these patterns. Throughout the material in applied kinesiology there will be reference to neurologic disorganization. The examiner must determine whether the involvement is primary failure of organization, or a problem which has developed secondary to some other involvement. When neurologic disorganization has developed secondarily, the procedures described next as cross crawl patterning are ineffective in obtaining permanent results. The physician must find and correct the basic underlying cause of the neurologic disorganization, or the patient will continue to have exacerbations and consequent symptoms from the problem. If there is, in fact, a failure of original organizational development, then of course the procedures originally introduced by Doman and Delacato and modified by Goodheart are necessary for correction of the problem.

8—17. Near-point sighting test. Have patient align finger with examiner's finger. Patient's finger will line up with the dominant eye. Do not allow patient to squint with either eye.

CROSS CRAWL PATTERNING

Cross crawl patterning was introduced into applied kinesiology by Goodheart[12] after he observed a patient in collegiate swimming competition develop severe pain in the back and chest muscles following long-distance competition. The corrections Goodheart made were effective, but they did not last. When the patient swam again, the symptoms reappeared and the improved muscle function was lost. Goodheart noticed that his swimming was like a crawling pattern in which the head-turn and breathing were done on only one side. The swimmer stated that if he attempted to breathe from both sides, it would disrupt his pattern and interfere with speed. Knowledgeable about Doman and Delacato's hypothesis, Goodheart attempted various forms of cross patterning and found that a specific pattern of cross crawling eliminated the muscular weaknesses and returned the hypertonic muscles to normal, with no other therapy administered. The crawling pattern was done with the patient in a supine position; the pattern that eliminated the muscular weakness and hypertonicity was turning the head toward the side of weakness as the shoulder flexed on that side and the opposite leg was flexed.

Evidence of the need for cross patterning is given by positive findings on the tests described by Delacato and on

associated applied kinesiology tests, both described here earlier. There is also evidence of a possible need for cross patterning when the patient exhibits other signs of neurologic disorganization known as "switching," described later. In the early days of applied kinesiology's use of cross patterning, a frequent indication was considerable muscle weakness on one side of the body and hypertonicity on the other. This is still an indication for possible cross patterning; however, procedures have been developed which will more rapidly take care of this condition in many instances. They will be discussed as we progress through this text.

Patterning is done in the supine position, with opposite arm and leg flexing to the maximum and then returning to the table. The other arm and leg are then flexed to the full amount, and the procedure is repeated sequentially. The therapeutic effect of the cross patterning comes from the head-turning activity. The patient is considered patterned to a particular side when his head is turned to that side as the shoulder is flexed and his opposite hip is flexed. His head is returned to the neutral position as his arm and leg are brought down to the table. When the opposite arm and leg are flexed, the head remains in the neutral position. The direction in which the patient is patterned does not necessarily correlate with the dominant hemisphere, or any aspect of bilateral brain function. The patient may require patterning to either side, but not both.

8—18. Head turns to right as right arm and left leg flex.

8—19. When left arm and right leg flex, patient's head remains in the neutral position.

The direction in which the patient is to be patterned is first determined by a test used early in applied kinesiology. This is the leg internal rotation test. This test was originally considered to be a "psoas turn-in"; however, there is controversy about the rotational aspects of the psoas (see psoas later in this text). The examiner grasps the patient's ankles and rotates the legs to obtain maximum internal rotation bilaterally. A comparison of the internal leg rotation is observed, and the leg which has maximum passive internal rotation is considered to be the weak side. The leg which resists internal rotation is considered to be the hypertonic side. The patient is then patterned to the weak side. For example, if the right leg rotated internally more easily and the left showed resistance, the patient would be patterned with his left leg and right arm going into flexion as his head turns to the right. The head always turns to the side of patterning as the arm on that side goes into flexion. There should be a strengthening of weak muscles from the patterning procedure.

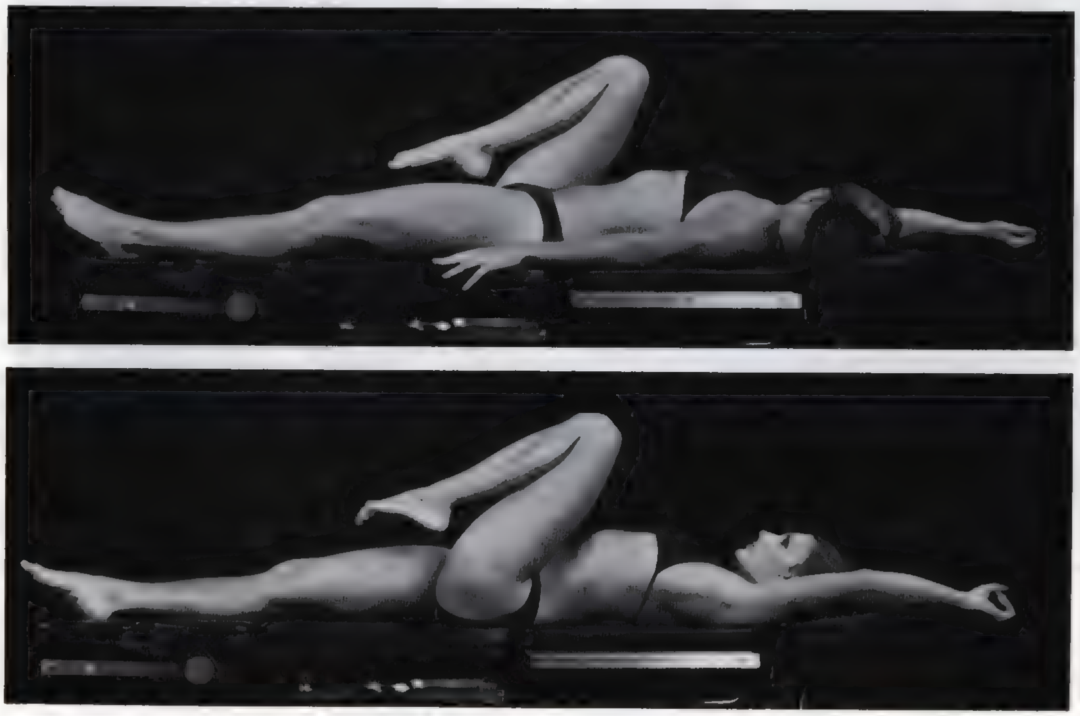
Although the leg turn-in test generally gives the appropriate side for patterning the patient, it is **absolutely** necessary to use a therapeutic trial to determine if this direction enhances muscle function. This is accomplished by having the patient repeat the procedure approximately six times, and then testing previously weak muscles to determine if they have improved in function. An important sequential test that should always follow is to then have the patient pattern in the opposite direction, to determine if the muscles return to a state of weakness and/or hypertonicity. This is extremely important because improper application

of cross patterning not only fails to help the patient, it can potentially cause significant harm.

There is a type of patterning which differs significantly from the cross pattern described here. It is called a "homolateral" crawl pattern, which Goodheart[15] associated with schizophrenia. This correlates with Delacato's classification of the pons organization level. A homolateral pattern refers to flexion of ipsilateral extremities in a crawling manner. It is done by flexing first one side and then, after returning the extremities to the table, sequentially flexing the opposite side. An individual organized in a homolateral pattern will develop significant muscle weaknesses throughout his body when doing a cross crawl pattern. A cross crawl pattern administered to an individual who is in homolateral organization can cause significant exacerbations of symptoms.

If an individual has a homolateral crawl pattern, do not administer any therapy until the AK approach to schizophrenia has been studied. This is presented in Volume V of this series, and elsewhere in the literature.[15, 37] This is one reason why it is absolutely necessary to do a therapeutic trial on each patient who receives cross crawl patterning.

8—20. Leg internal rotation test showing right leg with more available medial rotation, indicating a probable right cross crawl pattern.



8—21. Homolateral crawl

Patient Education

A good time to provide patient education regarding the purpose of the cross crawl procedure is during the therapeutic trial. The patient can be shown that the procedure improves muscle function and influences the body's organization. After favorably influencing function, the improper pattern is given to the patient, having him turn his head to the opposite direction. As this procedure begins, tell the patient, "It is extremely important that you do this procedure correctly. Not only will an improper procedure not help you, it will potentially cause problems. Let's try a wrong procedure and see what happens." If the correct procedure has been administered and now the wrong procedure is tested, there will be an immediate and dramatic weakening of the patient's muscles as observed on manual muscle testing. The patient readily understands the importance of the procedure.

We must understand that many individuals who need this organization are those with neurologic disorganization which causes them to perform many activities in a con-

fused manner. They also tend to understand instructions in a confused manner. It is valuable to give instructions for the procedure in a written format so the patient can take it home. Early in my use of these procedures, I commonly observed patients doing the procedure incorrectly on subsequent visits. Giving written instructions with pictures illustrating the procedure helped considerably.

Your instruction to the patient will be more difficult in direct ratio to the patient's need for the procedure. There are times when the patient's organization is so poor that an assistant or family member must indicate manually which leg and arm should be raised, and when the head should turn. Having a family member attend instructions for the procedure helps to insure that it will be done correctly. This is especially necessary when children are being taught the patterning. With young children, especially those who are disturbed, getting the procedure done correctly sometimes becomes a vital endeavor. It may be necessary to have a family member stay with the child at all times during the procedure. It is not unusual to see a child start the procedure correctly and then shift unconsciously into a homolateral crawl. Ray[29] devised a clever method of helping children through this procedure. He tied a string around the ankle of one foot, with the other end of the string tied to the wrist of the opposite hand. In the same manner, a second string was tied to the opposite extremities. Thus, when the arm began to raise, it tugged the ankle of the opposite extremity, indicating which leg the child was to raise.

Once the patient has been taught the cross pattern activity, it should not be forgotten by the doctor or staff. The procedure should be re-evaluated the next time the patient is in the office, to determine if the activity is being done correctly and is still appropriate for the patient. Sometimes therapeutic changes being made by the doctor alter the requirement of the patient's patterning activity. If this is the case, it is generally an indication that the patterning was not the primary involvement, but rather another factor that the physician is concurrently treating.

Repetitions and Length of Treatment

Thirty repetitions a day are usually sufficient for establishing neurologic organization. In some very severe cases, it may be necessary to do the thirty repetitions three times a day. If the requirement for cross crawl patterning correlates with some activity such as swimming, running, etc., there is value in doing the procedure immediately before and after that activity. The period of time over which the patient continues the patterning varies considerably. If the patient still needs the activity after several months of diligent patterning, some other factor is probably causing the neurologic disorganization. Again, this correlates with the severity of the patient's original disorganization.

Thought Process

Early in applied kinesiology it was observed that the cross patterning activity significantly improved the patient, but often this improvement ceased after a few weeks. When first using the patterning, the patient would gain relief of muscular hypertonicity and other symptoms; after a few weeks there would be no relief. This was a confusing situation until it was observed that the patients who did not continue to improve were doing the patterning procedure in a fast, almost unconscious manner. After having done the procedure for a period of time, it became an automatic activity needing minimal or no mental activity. This was evaluated by having the patient go through the cross patterning procedures, then testing previously weak muscles. There was no improvement in muscle strength, as there had been in the early use of the procedure. It was extremely interesting to observe that if the patient went through the cross patterning procedure mentally, without movement of the extremities or head, the previously weak muscles improved in strength as observed on manual muscle testing. This seemed to indicate that the patterning activity is not one of simply moving the extremities and head through a patterned activity; instead, it is a somatic-mental integration. When having the patient mentally visualize the cross patterning activity, the examiner can usually see slight tensing of the muscles of the appropriate extremities and neck, and eye movement. This indicates that there is actually slight muscle activity when the patient is visualizing the procedure.

It is necessary to describe the mental-muscle integration of these procedures to the patient; otherwise, a rapid, ineffective cross patterning, done more on reflex activity than by using the integration of the mind with the body, will develop. This is especially important in children. Mentally going through the improper pattern, which potentially includes the homolateral crawl pattern, will cause general muscular weakening as observed on manual muscle testing.

Additional Procedures

There are several additions to cross patterning that can enhance the procedure. If the patient is severely disorganized, it is best not to add any additional activities to the patterning; the patient will probably have enough difficulty with the basic procedure. As it becomes easier for the patient, additional factors can be added.

The eyes can be integrated into the procedure by having them follow superior and lateral with the hand as the arm is being flexed above the head, as if to watch the arm. This eye movement can be done to both sides. When having the patient do a cross crawl pattern mentally, it will be observed that there is automatic eye movement. In an individual who is not poorly organized, there will be automatic eye movement with the hand as he performs the patterning. The patient significantly requiring the cross pattern will need the visual activity.

The importance of eye position in motor re-education as a result of disease or trauma is stressed by Stejskal.[35] The deviation of the eyes influences the muscles of the neck, trunk, and limbs. This movement principle, called "eyes-hands," is a naturally associated movement. Stejskal recommends that it be widely used in muscular re-education.

Respiration can be correlated with the patterning by having the patient inspire as his arm and leg go up, and breathe out as they return to the table. The breathing pattern is repeated as the opposite arm and leg are raised. This activity appears to be helpful neurologically, and it can also be of value sometimes in slowing down a patient who continually does the cross patterning too quickly. Of

course, if the patient continues to do the procedure too rapidly with the breathing activity, hyperventilation will result.

The addition of some of these procedures can help obtain mental activity with the patterning in an individual who has a tendency to do the activity without thought. In severe cases, it is helpful to have the patient verbalize the activities as they are being performed. For example, the patient should say, "Right arm, left leg up, turn head to right. Right arm, left leg down, straighten head. Left arm, right leg up, keep head straight," and continue to repeat this verbalization throughout the procedure.

8—22. Lateral cross patterning to the right.

8—23. Posterior cross patterning to the right.

Other Positions for Cross Patterning

In some instances, there seems to be value in having the patient do the cross patterning in the standing position. It can be done laterally and to the posterior. When the activity is done laterally, the patient stands on one leg and abducts his arm on the side of stance and the contralateral leg. His head is turned to the side of arm abduction in the same direction that was determined for the supine cross pattern activity.

The posterior patterning is done similarly by standing on one leg and extending the shoulder of that side, while the contralateral leg extends. Again, the head is turned to the side of shoulder activity on the side of initial patterning determination.

Nutritional Support

There is clinical evidence that in some cases nutritional support may be needed to enhance the development of improved organization. The nutrition required is usually brain concentrate or nucleoprotein extract, or ribonucleic acid. Although any indicator muscle associated with the disorganization will usually reveal the need for one or more of these substances, the supraspinatus is generally found to be the most effective muscle to test.

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Chapter 9

Disorganization Within the Body

Introduction

Many functional health problems develop as a result of dysponetic signaling and imbalanced energy patterns within the body. Signaling is accomplished by the nervous system and by chemical agents. The chemical agents are molecules or ions within the tissue fluids which are carried by osmotic concentrations and pressure gradients from one point to another. Here they interact with the cell membrane receptors, intercellular receptors, or nuclear receptors, providing their signaling effect. Chemical control is predominantly from the endocrine system. This text will deal primarily with nervous system control and organization. Chemical signaling is dealt with in Volume V of this series.

The term "energy patterns" refers here to the meridian system developed primarily by the Chinese with their acupuncture therapy. The meridian system seems to agree with the clinical application of applied kinesiology, and it is an important factor in understanding body function. Meridian balance is important in considering disorganization within the body, and it will be discussed in detail in Volume III of this series.

A functional health problem, if allowed to persist, may result in the development of pathology. Many problems may be present for a considerable period of time before the individual is aware of symptoms. Applied kinesiology appears to give us the opportunity to find these functional problems, not only after symptoms have developed and the patient is seeking relief, but also before symptoms develop. This is important because many of these problems are not revealed by standard laboratory and physical diagnostic procedures. These are the patients who are examined and pronounced in good health, even though they have headaches, fatigue, and backaches. The basic underlying cause of the functional problem can be on any side of the triad, including structure, chemical, and mental.

Since the term "disorganization" is the basis of this chapter, it becomes necessary to understand the term as used here, and some ramifications of organization within the body. Disorganization[5] is defined as ". . . the act of disorganizing (1) to destroy the organic structure or regular or systematic arrangement of, (2) deprive of organization, (3) throw into disorder or confusion." Nearly all these standard definitions fit the use of the term here. The body, when functioning normally, operates in a predictable, logical, organized manner. If some factor from the structural, chemical, or mental side of the triad of health creates an imbalance of function, signals are developed for the body to attempt to return itself to normal in the fastest, most efficient manner. If the dysfunction is great enough that the body cannot immediately return itself to normal, backup mechanisms appear for continued function. The protective, corrective backup systems of the body are incomprehensible to our present knowledge. As has been said in applied kinesiology, there are backup systems for backup systems to backup systems. If it were not for these body activities, there would be no adaptation to the everyday stresses of all kinds to which man is subjected.

There is an optimum function for the organism. When it is not functioning at this level, it is disorganized. We do not mean to imply by this that it is operating in a random, haphazard manner, for if it were, death would probably occur within a very short time. It would, as the first definition states, destroy the organic structure. But to go on with that first portion of the definition, disorganization in the body does destroy the regular or systematic arrangement of the organism, thus depriving it of optimum function. As Gunn[2] points out, there is not random, haphazard activity within the body. When we find it to appear that way, it is probably because of our lack of understanding of the backup mechanisms and the specific efforts the body is making to correct the condition. We seem to be involved with two types of disorganization — that which appears to be understood and the mechanisms hypothesized, and the type which seems to be random, haphazard, and confused, but often is probably only mechanisms the body is using to maintain itself in the best possible state under the circumstances, and that we do not understand. I choose to call the first type "predictable disorganization," and the second random type "unpredictable disorganization."

The body should function in a predictable, logical,

organized manner. Applied kinesiology examination is designed to evaluate for this organization and, if not present, to find out why.

The philosophy that there is a reason for every type of disorganization appears to be a sound working premise. Keeping this basic philosophy in mind, many once enigmatic health problems have been clinically clarified, or at least a hypothesis developed and an approach for correction designed.

Predictable Disorganization

There are many types of disorganization within the body which are predictable in nature. They follow specific patterns. Some of the patterns are well-known in physiology, while others are patterns developed in applied kinesiology and other investigative and therapeutic efforts which are not as well-known. If the physician is familiar with the pattern, these forms of malfunction can usually be easily located and corrected. Patterns of predictable malfunction or disorganization are cited throughout the material on applied kinesiology. Because it is so important to always consider all three sides of the triad of health, the triad will again be used to give some representative examples of the two types of disorganization.

Structure

When one area of the body is not functioning correctly, there is a significant possibility that the problem has developed from dysfunction in a distant part. For example, the patient may come in with pain in the upper thoracic and cervical regions, with dysfunction of the shoulder. The actual imbalance causing strain in that area may be in the pelvis, either a category I or II distortion. This may develop a compensating malposition of the shoulder girdle, creating the stress the patient is experiencing. This association is often seen. Those knowledgeable about it will find the disorganization of the thoracic and cervical spine and the shoulder involvement secondary to the pelvic problem as predictable disorganization. The symptoms the patient is experiencing are adaptive to the pelvic involvement. Many health problems which require considerable searching by the physician are adaptive; the basic underlying cause must be found, and the symptoms will be permanently removed. When reference is made to permanent removal of a problem, it, of course, is based on the provision the patient does not continue detrimental habit patterns or is not re-injured.

Another example of an adaptive problem, which is disorganization of the body but of a logical nature, is an anteriorly rotated pelvis creating adaptive lumbar and cervical lordosis. The patient may exhibit symptoms in the suboccipital region, yet the basic underlying cause of the problem is pelvic imbalance.

Not as well-documented in the literature is the coordinated function of the cranial-sacral primary respiratory function. If the sacrum and cranium both need an inspiration assist correction, they should both need the correction on the same side. This is predictable malfunction; it could also be termed disorganization, as the sacrum and cranium are disorganized in their function with the rest of the mechanism. If there is inspiration assist of the sacrum on the right, and inspiration assist of the cranium on the left, there is no coordinating activity. In other words, the disorganization is of an unpredictable nature.

Electrotherapy has varying influence on the body, as observed by applied kinesiology manual muscle testing. In an informal clinical study in my practice, I evaluated patients for organization ("switching") before and after electrotherapy procedures were administered. The electrotherapy was in the form of shortwave diathermy, ultrasound, pulse wave high frequency, and sine wave. The interesting results were the random, unpredictable effects which were observed upon testing for organization. In some cases, the patient seemed organized prior to the electrotherapy but was not after the therapy was administered. In other cases, there was poor organization prior to electrotherapy and normal organization after it. How the electrotherapy would influence the body, either positively or negatively, did not seem to have any pattern. Any type or location of therapy could give either a positive or negative result. The randomness of the effects may be a reason why there are variable results in the use of electrotherapy.

Chemical

The body can be under chemical influence in either a positive or a negative manner. Here we will deal with the negative factors, and how the body responds to them — predictably or unpredictably. The influence on the body can come from many negative sources, including diet, environmental toxins, and improper use of nutritional supplements.

Diet can be a temporary indiscretion, such as eating a very highly spiced Mexican dinner which causes irritation to the digestive system. The body will probably act in a predictable manner, increasing the energy in the stomach meridian to help combat the irritants. This could erroneously be classified as a disorganization of the body. In reality, it is an organized pattern of the meridian system to meet the body's needs, and is temporary in nature. No treatment is necessary if the physician recognizes the process taking place.

The influence of toxins from the environment can create many types of signaling within the body. When there is localized disharmony in keeping with the body's effort to detoxify or protect itself, there is disturbance or disorganization; again, it is predictable to the needs of the body. An example is bronchitis secondary to cigarette smoke.

The point is sometimes when it appears that the body is disorganized, it is — but for the benefit of the organism.

Care should be taken not to try to balance the energy patterns of the body when, in reality, they are out of balance for the body's benefit.

Unpredictable disorganization in some instances may be classified as confusion within the body. This may be from chemical influence overriding the body so there is no longer responsible reaction of the body to fight for a return of homeostasis. This is frequently caused by medications, environmental toxins, and diet with which the body cannot cope. Looking for a possible chemical cause of unpredictable disorganization is a good investigative effort.

Mental

Prolonged mental stress can manifest itself in many ways. A common involvement is functional hypoadrenia, which in turn affects hormone balance, causing signaling to interfere with mineral balance, autonomic nervous system balance, and regulation of carbohydrates. This is predictable disorganization if the physician is knowledgeable about the stress and its effects on the adrenal gland.

What has been classified as unpredictable disorganization can often manifest itself as mental symptoms. A peculiar type of disorganization is present in schizophrenia. With the initial recognition by Goodheart of the peculiar schizophrenic organization, this condition is much more easily treated, with effective results, and can usually be classified as predictable. Examination and treatment procedures are in Volume V.

The individual with apparent mental problems is quite frequently tied into the chemical side of the triad by the use of tranquilizers and antidepressants, which may cause considerable unpredictable disorganization as observed by applied kinesiology methods. It is important that the physician recognize that these medications may interfere with the usual patterns observed in AK evaluation. It appears that having the patient chew ribonucleic acid (discussed on page 51) is of value in some way to neutralize the effects of the medication, as observed by manual muscle testing.

Predictable disorganization consists of factors which the doctor can expect to find during an examination. As an examination progresses, all factors should integrate into a well-woven pattern. This continual feedback of integration and predictability gives the physician supportive information that his examination is progressing in a manner probably destined to find the basic underlying cause of the health problem. It is when there is a lack of correlation, or random observations that do not fit the pattern, that the physician should be concerned that there is some confusing factor which has not yet been found.

There is a reason for everything which happens within the body. The question is, do we know enough to find the reason? As more has been learned, it is rare that a doctor knowledgeable about applied kinesiology principles and examination procedures cannot find the reason examination findings fail to correlate. It seems obvious that as knowledge in applied kinesiology builds, the rare instances when an examination does not correlate will be understood. The student beginning to use AK should be patient when examination findings seem confusing; there is an answer. Solving the current confusing situation makes succeeding examinations that much easier.

The early applied kinesiologist often had to proceed on blind faith in the presence of confusing findings. The faith came from observing positive results in patients who previously had not responded to treatment. Continued investigation of confusing examination findings has led to improved diagnostic capability. This chapter discusses many of the causes of neurologic disorganization within the body. In succeeding volumes are additional factors which cause disorganization, such as the endocrine system, mental health problems, cranial primary respiratory dysfunction, and the meridian system. Mastering these applied kinesiology factors gives continuing rewards. Each new patient examination should provide the same thrill experienced when a chess champion finds a new opponent.

Unpredictable Disorganization

Unpredictable disorganization differs significantly from that which is predictable, inasmuch as the predictable is understandable, and the pathways of improper signaling can at least be hypothesized. This gives opportunity for the physician to make corrections which have probable outcomes. In the unpredictable situation, the examination makes no sense, and some semblance of organization must be obtained before the examination and ultimate corrections can proceed.

In the early days of applied kinesiology, there were frequently instances when confusion would develop in an examination because the findings did not fit any known pattern. As more knowledge has been gained in the application of applied kinesiology, many of these confusing situations have been resolved to better understanding. What at one time would have been called unpredictable disorganization can now be considered predictable. In all probability, many of the factors which are now considered unpredictable will ultimately be better understood. Here are examples of some of the unpredictable disorganization still observed.

Inconsistency of weaknesses observed on manual muscle testing is compared to that which is indicated by the postural pattern of the individual. For example, an individual with an elevated right shoulder and no other evidence of imbalance typically has a weak right latissimus dorsi which is failing to hold the shoulder down. In an individual who would be classified as unpredictable, the right latissimus dorsi would test strong, while the left would exhibit the weakness.

The TS line indications of involvement should correlate with those found in the body. A person exhibiting unpre-

dictable disorganization may show a positive TS line indicator for the left psoas, yet the left tests normal and the right exhibits the weakness on testing.

Most meridians have several muscles associated with them. If there is deficient energy exhibited in a meridian and excessive energy in its contralateral counterpart, the examination is expected to show weak muscles associated with the meridian on the deficient side and strong muscles on the excessive side. In an individual with unpredictable disorganization, the examiner may find weak muscles associated with the meridian on both the deficient and excessive sides. An example is muscles associated with the bladder meridian, which are ankle muscles and the sacrospinalis. There may be weak ankle muscles on the right, while the sacrospinalis is weak on the left — an unpredictable finding.

Another type of unpredictability recognized early in applied kinesiology is that the examination findings change patterns as the evaluation proceeds. An individual may have a muscle that tests weak, and then a few minutes later tests strong though no therapy of any type has been administered and the test is under the same conditions. In this type of patient, muscular weakness might change from one muscle to another as the examination progresses, with no pattern revealed.

When unpredictable disorganization such as that described is present, examination fails to develop adequate consistent information. Attempted therapeutic approaches with this inconsistency are clinically ineffective, and may even have an iatrogenic effect because treatment may be administered on the basis of erroneous indications. This type of unpredictable disorganization is known clinically in applied kinesiology as "switching." The term is quite applicable because of the changing nature of the examination findings, as well as the inconsistency of clinical findings relative to the two sides of the body.

As has been mentioned, several factors that were originally considered as switching are now more clinically understandable, and have changed from the status of unpredictable disorganization to a predictable classification. As more knowledge is gained in applied kinesiology, patients who were at one time constantly switched, or often had the condition return, are now being more thoroughly organized so that the condition does not return. Typically, problem patients whose conditions resist well-intentioned and thorough therapeutic efforts are those who have unpredictable neurologic disorganization that continues to return although the physician has repeatedly eliminated the diagnostic indicators for its presence.

The body is a marvelous organism that has many control mechanisms which are secondary and supportive if primary control is lost or dysfunctions. It seems reasonable that many forms of switching are actually evidence of the body substituting a control mechanism which operates in a different manner when a primary mechanism is incapable of functioning. This certainly is not an adequate hypothesis for switching, but that is the entire nature of switching; it is not thoroughly understood. If it were, it would be predictable.

EVALUATION FOR SWITCHING

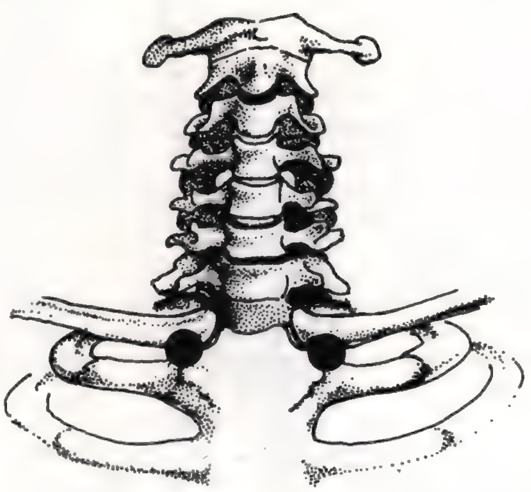
There are many approaches to influence switching. The advanced clinician in applied kinesiology has many options with which to work. These are considered throughout the material in applied kinesiology. Here we will discuss methods of examining for switching and bringing it under control, at least on a temporary basis, for those being introduced to AK. After this discussion, there will be an introduction to some of the mechanisms presented in this text and throughout the material on applied kinesiology that deal with switching. At the least, temporary organization of switching is necessary in working with a patient who has unpredictable disorganization. The simpler procedures are those used early in applied kinesiology which Goodheart found clinically useful in bringing the findings into organization. These methods are still used today, and are augmented by other therapeutic approaches which have either been introduced into applied kinesiology or developed within its framework. Conditions which have been observed to contribute to the switching problem are briefly discussed later in this chapter. These conditions will be discussed more thoroughly later in the text, unless the condition is referenced to another text.

Each new patient should be tested for the possibility of switching. This is accomplished primarily by three methods used in applied kinesiology for quite some time. They are evaluation of the acupuncture point K27, governing and conception vessels, and "ocular lock." Our experience shows that evaluation of these factors will find nearly all conditions of switching in the body. The evaluation for switching should continue throughout the course of a patient's treatment, on every visit. The most common error leading to poor results with a patient is failure to eliminate switching and general neurologic disorganization. Whenever switching continues to return, the prognosis for regaining the highest possible plateau of health is poor.

If switching recurs on subsequent visits, the physician should evaluate further to determine the cause. Ideally, once switching is corrected it should never return unless the individual experiences trauma of either a structural, chemical, or mental nature. If the physician is just beginning to study applied kinesiology, there will probably not be enough background information to correct switching in all patients on the permanent basis it deserves. In this case, the elimination of switching indications on each visit prior to further examination is an adequate approach. As the doctor develops more thorough knowledge of the principles of organization in the body, he will better understand disorganization and how to more permanently correct it.

K27 — UMBILICUS

The first approach used to influence switching in applied kinesiology was bilateral stimulation of K27 and the umbilicus. K27 is an important acupuncture point known as "the home of associated points," or the associated point for all other associated points. The associated points are points along the spine on the bladder meridian which can correlate with any meridian imbalance. There is also clinical evidence that they are associated with subluxations of the spinal column. K27 is the 27th and last point on the kidney meridian. It is located at the junction of the sternum, clavicle, and first rib.



9—1. Location of kidney 27 (K27).

Goodheart[1] describes K27 as the switchboard between the two sides of the body. Dramatic change in body organization, especially that of spinal activity, can be observed from stimulating K27 and the umbilicus.

When K27 is abnormally active, it will therapy localize. Therapy localization at this point is one of the major methods of determining if a patient is switched. It must be remembered that therapy localization only tells **where** an involvement is, not **what** the involvement is.

When switching is due to K27 dysfunctioning, it is treated by vigorous stimulation of one K27 point while simultaneously stimulating the unbilicus area. This stimulation is continued for approximately twenty seconds; then the other K27 and the umbilicus are stimulated vigorously in a similar manner. After stimulation of K27 and the umbilicus, there should no longer be positive therapy localization to K27, and other indications of switching should be removed. In other words, muscular weaknesses should now correlate with the postural analysis, meridian system imbalance, TS line, and the total symptomatic picture.

Occasionally an additional point needs to be stimulated; it is dubbed the auxiliary K27 and located adjacent to the transverse process of the 11th thoracic vertebra bilaterally. If this point therapy localizes, it is stimulated in a manner similar to that of K27 while simultaneously stimulating the umbilicus.

Additional knowledge in applied kinesiology, especially that obtained with challenge and therapy localization (discovered after K27 was associated with switching) reveals that other factors besides the meridian point are present at this location. This is the location of the neurolymphatic reflex for the intrinsic spinal muscles, and the provisional neurovascular point for the teres major. Also, when there is a category I or category II pelvic involvement, there will be dysfunction of the clavicle and/or first rib head with the sternum on one or both sides. These involvements will frequently manifest themselves as subluxations, and will challenge and therapy localize.

For accurate understanding of the mechanisms involved in switching, it is important that the doctor understand whether he is therapy localizing K27, the structural strain of the shoulder girdle from a category I or II, or the neurolymphatic reflex of the intrinsic muscles of the spinal column. An active acupuncture point will therapy localize when the patient touches the point. Also, it appears that it is the only type of point which will consistently therapy localize if the doctor or an assistant makes the contact for therapy localization. This is because of the apparent electromagnetic nature of acupuncture. What appears to be an antenna effect on the point causes the effect, just as if the point were stimulated. The nature of acupuncture and the differences between acupuncture points and various reflex points of the body are discussed thoroughly in Volume III on meridian therapy.

If positive therapy localization is the result of structural strain at the junction of the first rib and clavicle with the sternum, there will be a positive challenge of the articulations as well as the positive therapy localization. Manipulation of the subluxation, or relieving strain by correcting a pelvic involvement, will eliminate the positive therapy localization if there is not an active reflex or meridian point.

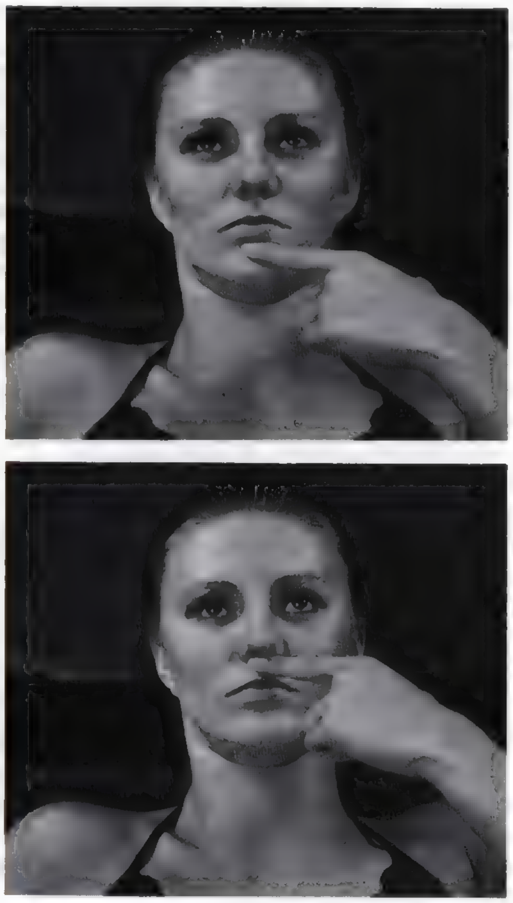
The ability to differentiate what is being therapy localized is important in order to know what is being treated. Regardless of the reason for its presence, positive therapy localization at the junction of the first rib and clavicle with the sternum can nearly always be temporarily removed by vigorously stimulating the area. It will usually return immediately when a patient walks if the cause was structural strain from a category I or II. If this is not considered, the physician may believe that switching is being corrected when in reality only a temporary effect takes place. K27 as a factor in switching is important; however, it must be put into perspective as not being the correction for all switching problems. This comes into better perspective as we progress in this discussion with some of the other factors which contribute to switching.

GOVERNING VESSEL — CONCEPTION VESSEL SWITCHING

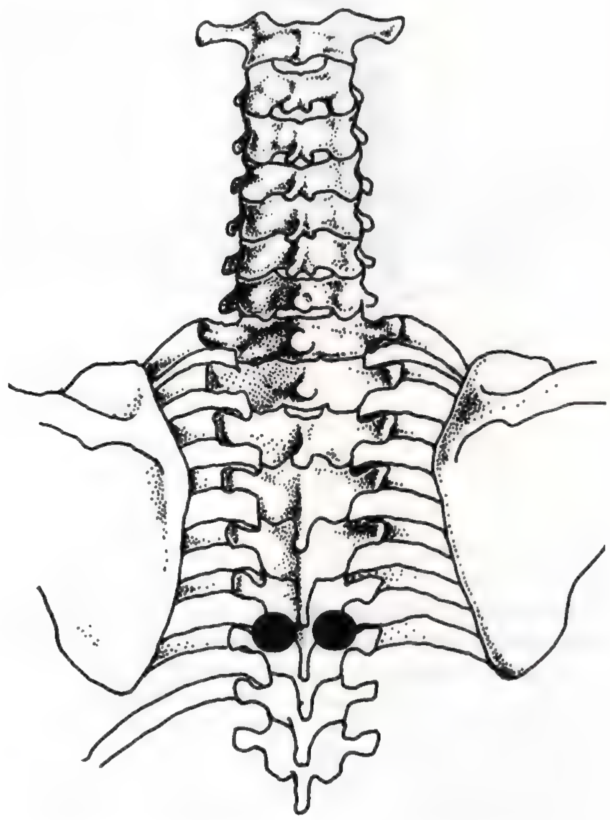
Switching is sometimes correlated with a lack of communication between the energy patterns of the governing vessel and conception vessel, which are two mid-line meridians of energy in the meridian system. (This is discussed in Volume III. A brief discussion here will suffice to allow evaluation and correction.) This can be evaluated by therapy localizing CV24 or GV27. CV24 is the last point on the conception vessel meridian, and is located in the center line just below the lower lip. GV27 is the next to last point on the governing vessel meridian, and is located just above the upper lip.

When either or both of these points therapy localize, treat as follows. Contact CV24 and CV2 (upper symphysis pubis) simultaneously with solid pressure for twenty to thirty seconds. Next, contact the luo point (connector point) to GV1 (located at the tip of the coccyx) and hold for twenty to thirty seconds. There will often be a vertebral subluxation in the vicinity of the associated point for the governing vessel, which is bladder 16. Bladder 16 is located close to T6 and T7. Challenge these vertebrae for a subluxation and correct in the usual manner.

Re-therapy localize GV27 and CV24 to determine if correction of switching is obtained. This system will generally correct this type of switching, at least temporarily. Other factors of meridian function should be evaluated to maintain the correction of the governing vessel-conception vessel form of switching if it recurs.



9—2. *Location of CV24 and GV27.*



9—3. *Bladder 16, located close to T6 and T7.*

OCULAR LOCK

Poor ability of the eyes to function together was discussed with the subject of developed neurologic organization. This poor function was recognized early in applied kinesiology in switched individuals by Goodheart.[1] Testing the function of the two sides of the body together has been enlarged considerably during the history of applied kinesiology.

The first combined testing function was having the patient turn both eyes as far as possible in one direction, and testing a previously strong indicator muscle for weak-

ening. The test is positive if the body cannot maintain neurologic integrity and the indicator muscle weakens. This condition has become known as ocular lock. The testing is done with the eyes right, left, up, down, and at oblique angles. It will occasionally be found that ocular lock is present only in a very specific eye position, such as 30° superior right. Another method of evaluating for ocular lock developed by Kirchner[3] finds the involvement more easily. Have the patient follow the examiner's finger, turning his eyes completely around clockwise, and then test a previously strong indicator muscle for weakening. The test is then repeated counterclockwise. If a previously strong muscle tests weak, the patient cannot efficiently use his eyes on a bilateral basis. Generally, the examiner can see when the eyes fail to track around the circle in a saccadic or quick, jerky motion of one eye, failing to follow the finger.

Electromyographic evidence of eye movement affecting skeletal muscles has been demonstrated by Triano[4] in a preliminary study. The action of the suboccipital muscle group was studied with surface electrodes in an individual who developed recurrent muscle hypertonus in that area. While in the seated position, the muscles were relaxed and nil electrical activity was recorded. Remaining in this position, the patient turned the eyes to the various quadrants and the electrical activity remained nil until the eyes were turned to the right superior quadrant of gaze. The left suboccipital muscles became hyperactive, and the patient's symptoms developed while maintaining that eye position. Although anecdotal, this gives an approach for further research to determine the basis of the ocular lock mechanism.

Goodheart[1] originally correlated ocular lock with the glabella cranial fault, and then with K27 and umbilicus. It will often be found that this involvement correlates with other cranial primary respiratory faults; until all necessary corrections are made, switching will return.

Stimulation of K27 and umbilicus will nearly always remove the indication of ocular lock. Unfortunately, it is usually temporary. When the patient walks and otherwise functions on a daily basis, the indication of ocular lock usually returns until the cranial faults have been corrected. Dysfunction of the cranial primary respiratory mechanism interferes with the function of cranial nerves. It is reasonable that the motor nerves of the eyes (cranial nerves 3, 4, and 6) are involved in ocular lock. The advanced applied kinesiologist should correct the cranial mechanism, pelvic categories, and any sacral involvement. This is usually necessary to permanently remove an ocular lock problem. The beginning applied kinesiologist can remove ocular lock and the indications of switching by stimulating K27-umbilicus prior to examination and treatment. This is an adequate approach until the more advanced material of the cranial respiratory mechanism and other procedures are learned.

OTHER FACTORS WHICH INFLUENCE SWITCHING

Below are brief descriptions of many of the involvements which cause switching to recur. Remember that when switching is present, effective correction is important. It should not return on a regular basis. As an applied kinesiologist becomes advanced, it is inadvisable to routinely stimulate K27-umbilicus on each office visit prior to examination. Some teachers in AK have recommended that support personnel stimulate these points before the doctor sees the patient, in order to save time. This is inadvisable because it removes indications of switching; the patient may continue to have the problem and the doctor will be unaware of it. Obviously, when a problem cannot be observed, it cannot be corrected. The best procedure is to evaluate for switching on the first visit; if it is present, use corrective procedures to organize the patient. On subsequent visits re-evaluate for switching and, if it recurs, begin observing for other conditions which contribute to the problem. The advanced applied kinesiologist will easily recognize when a patient is switched because the examination findings will not correlate. This is observed by discrepancy of actual examination findings with what is indicated by the TS line, postural analysis, and/or meridian evaluation — the three major diagnostic factors in AK. Problem patients are those who remain switched.

Cranial Primary Respiratory Dysfunction

There are many ways that cranial dysfunction can influence the body and create the condition known as switching. Cranial dysfunction appears to be detrimental to normal cranial nerve activity. The considerable amount of sensory input from vision and hearing can be the explanation of why problems in this area influence switching. If the eyes or ears are not functioning well together, there is probably a constant strain on the nervous system in an attempt to adapt for better bilateral communication. In the event that bilateral activity cannot be efficiently developed by the body, the sensory input could be of a dysponetic nature.

There is dual innervation to the sternocleidomastoid and upper trapezius by spinal nerves and the 11th cranial nerve. Either a subluxation affecting the spinal nerves or cranial dysfunction affecting the spinal accessory nerve may cause disharmony between their actions. It seems reasonable that this can cause neurologic confusion regarding head-on-body position. The cranium and its role in neurologic organization is discussed thoroughly in Volume II.

Pelvic Dysfunction

The pelvis appears to have major influence in the switching phenomenon. The presence of a category I or II

will sometimes cause the indications of switching to return immediately as soon as the patient walks. After correction of the pelvic involvement, the patient can walk without having the indications of switching return (see Chapter 7).

The pelvis may also be involved in the primary respiratory mechanism. Described above is the relation of the cranium with switching. If the cranium dysfunction relates with a sacral primary respiratory fault or a category I pelvic involvement, the cranial fault will probably recur upon walking. This is discussed more thoroughly in Volume II.

Gait Mechanism (Including Foot Dysfunction)

A bilateral function frequently involved with switching is the gait mechanism. This is found by testing two cardinal groups of muscles in the gait mechanism. In normal gait function, both groups of muscles will test strong when tested together. In abnormal gait function, the two groups of muscles — or one of the two groups — will test weak when the groups are tested simultaneously. When the groups are tested individually, each is strong. In the gait mechanism complex of testing, there are six known sets of two groups of muscles to test. When there is dysfunction in the gait mechanism, a foot involvement is causing improper meridian function and possibly confused proprioceptive impulses to be sent into the neuronal pools. Improper gait mechanism function is a common cause of recurrent switching; it is indicated as a possibility when switching recurs after the patient walks or runs (see Chapter 11).

Failure of Organization to Develop

Normal cross pattern function should be present when an individual walks and crawls. This neurologic organization appears to develop through the cord, pons, mid-brain, early cortex function, and finally cerebral hemisphere dominance. It develops during the crawling and, finally, walking stages of youth (see Chapter 8).

Cloacal Synchronization

Cloacal synchronization is a system of evaluating the cloacal reflexes, located in both the anterior and posterior of the pelvic region. They are considered primitive centering reflexes. Their activity appears to correlate with the visual righting and labyrinthine reflexes and tonic neck receptors. All of these reflexes are involved with centering and/or orientation in space..

These reflexes are also evaluated by testing groups of muscles simultaneously. There are eight sets of muscles to be tested in evaluating these reflexes (see Chapter 11).

The cloacal synchronization factor may correlate with an unusual type of switching which therapy localizes with the right hand on the left K27 and the left hand on the right K27. This is known as cross-K27 therapy localization. It is associated with a homolateral crawl factor which strengthens muscles. When this is present, the usual cross-crawl pattern causes muscles to weaken. This pattern is present in schizophrenics and individuals who have heightened sensory disturbances. The schizophrenic pattern is discussed thoroughly in Volume V.

PRY Technique

PRY technique is a system of evaluating the organization of sections of the body with each other. The term "PRY" is an acronym for pitch, roll, and yaw, which are aeronautical terms indicating an airplane's orientation in space. The testing procedure is to evaluate the organization of the body in these movements and positions (see Chapter 11).

Ionization

The ionization balance of a patient shows a different type of switching. It is indicated by whether the patient therapy localizes to different aspects of the body palm up or palm down. It is not integrated with the right and left side of body communication, as are other forms of switching. A balance between positive and negative ions of the body appears to be maintained by the body's interchange of dominant breathing through either the right or left nostril. When, as a result of cranial faults or some other factor, the body does not have the option of choosing right or left nostril dominancy, an ion imbalance seems to result.

Occasionally a patient will be found who therapy localizes palm up on the anterior side of the body and palm down on the posterior side of the body. In this case, the individual has a switching problem which correlates with ionization and is influenced by stimulating the umbilicus and coccygeal areas simultaneously for twenty to thirty seconds. There will then be a change in the therapy localization, correlating with either palm up or palm down on both the posterior and anterior aspects of the body (see Volume V).

BODY LANGUAGE OF SWITCHING

It is very important for an applied kinesiologist to be familiar with the body language of switching. During the initial consultation, body language signs of switching can be observed which will help guide the physician's interview.

Of greater importance is the capability of recognizing the possibility of switching in the routine, day-to-day care of patients. This observation should be continual throughout all contacts with a patient. Even though switching is not present on a patient's initial visit, it could develop as body function changes during the course of therapy.

Recognition of the possibility of switching from body language is important, even if the doctor evaluates the patient for switching prior to therapy on each visit. It is possible for switching to develop during an office visit because of treatment provided changing the interactions within the signaling systems. Sometimes correction of one problem without finding and correcting a compensating problem can cause a patient not previously showing switching to develop it. When there is body language that gives evidence of switching, the patient should be evalu-

ated for it. Of course, when switching is indicated by some types of body language, it does not necessarily mean that the patient is switched.

An easily recognized sign of disorganization is the reversal of actions or thoughts. This is often seen as the patient does exactly opposite what the examiner requests, such as lying face down when asked to lie on his back, turning right instead of left, looking up instead of down, etc. Reversals are seen in the transposition of letters in typing or doing mathematics, and in saying the opposite of what is meant.

Poor coordination of the musculoskeletal system is evidence of possible switching. Numerous bruises on the legs or arms should alert the doctor to ask about bumping into coffee tables, door jambs, etc., while moving about the house. Often a woman will remark that she keeps bumping into the bed while making it, or a man will bump into machinery, although he works with it day after day. Children may have poor coordination in throwing or catching a ball. A child who is severely switched is usually the "klutz" of the playground. A child who has not efficiently developed unilateral function will tend to throw a ball with both hands. The doctor can observe for musculoskeletal organization while the patient moves about on the examination table or during various orthopedic and neurologic tests.

Walking and running is not body language the doctor ordinarily sees in the office; however, discussing these activities with a patient or parents can often bring out significant information. The organized individual has a rhythmic movement while walking and running, whereas the switched patient is awkward. There is a lack of balanced, rhythmic movement of the trunk during rapid locomotion. When looking for a balanced running pattern, it is best to observe entire body motion rather than trying to observe only leg and arm patterns. The motion is usually so fast that close observation of leg and arm pattern is impossible. The arms will move in a flailing manner instead of a balanced cross pattern. When discussing balanced musculoskeletal activity with a parent, the examiner will often hear, "Is this why Johnny's running looks so awkward?"

Stuttering, or its history, is frequently caused by switching. Many times a child has been able to overcome stuttering, but the neurologic disorganization which caused it in the first place may remain, to promote other health problems. Many stuttering cases are corrected simply by re-organizing the nervous system with applied kinesiology evaluation and subsequent treatment. Stuttering appears to be from failure to develop neurologic organization, or to be involved primarily with the stomatognathic system and its many ramifications.

All dominancy should be on the same side. If an individual is right-handed, he should also be right-eyed, right-eared, and right-footed. Failure to develop or maintain this organization makes an individual a likely candidate for switching. Treatment for mixed dominancy patterns can be directed to any one of the many conditions which are associated with switching. Evaluation for dominancy is discussed in Chapter 8.

As mentioned previously, the eyes should be able to function together efficiently. When they do not, the condition is known as ocular lock. There should also be a dominant eye with its organization well developed. The individual who has ocular lock, or poor development of dominancy, will tend to shift dominancy from eye to eye. This is the individual who, when talking to you, continually shifts dominancy from eye to eye and gives the "shifty-eyed" look. This body language of switching is generally the first indication seen by an applied kinesiologist during consultation. Its presence alerts the examiner to ask questions and continue observation for the possibility of switching.

The individual with poor neurologic organization is often a poor reader. This equates with the eyes not coordinating in a balanced manner, resulting in poor sensory input. The classic example of switching and its reversal is dyslexia, or mirror image reading. This is when a child will see the word "saw" and read it as "was." Most children with learning disabilities are switched. Often all that is necessary to correct the learning disability is to obtain re-organization of the nervous system as done in applied kinesiology.

Another example of neurologic disorganization manifesting itself with the use of the eyes is the patient who tends to go to sleep as soon as he starts reading. In nearly all these individuals, a previously strong indicator muscle will weaken immediately after one or two lines are read, either aloud or silently. This gives a clue that some type of neurologic insult has developed from the activity. As evidenced by the muscle weakness, the activity is apparently turning off the body; thus the sleepiness develops from reading. It is interesting that when these individuals read backward, aloud or silently, there is no weakening of a previously strong muscle. In other words, the individual starts at the end of a sentence and sequentially reads the words until he reaches the beginning. Because the Hebrew language, when written, is read from right to left rather than the reverse, as is English, Goodheart referred to this condition as the "B'nai B'rith" syndrome. This condition, as well as the others described here, is corrected with K27-umbilicus activation and other aspects that contribute to switching.

The most valuable asset the applied kinesiologist has for observing the body language of switching is his examination findings. The advanced applied kinesiologist knowledgeable in the cranial primary respiratory mechanism, meridians, TS line, postural analysis, and what should cause inhibition or facilitation of muscles, knows when examination findings are organized and fit a pattern as they should. Lack of this organization requires more in-depth evaluation of the patient, until the cause of the confusion is found. This is what ultimately finds the cause of basic underlying health problems.

Patient Education

There is value in knowing the body language of switching other than simply for evaluating the patient at hand. Patient education is of value so the patient will understand what aspects of his health problem correlate with this dysfunction. Since there is a hereditary tendency in many types of switching, the patient will apply the information to family and relatives. As the condition is being discussed

with the patient, there is often some response such as, "Do you mean this is why my daughter can't read?" or "My son has never been good in sports; could this be the reason?"

Knowledge of the body language of switching can also be valuable in developing improved doctor/patient rapport. The doctor reading the patient's body language during the consultation and examination develops considerable knowledge about the type of symptoms the patient probably has. Most of the time, switching symptoms are not voluntarily discussed with the doctor. When the doctor begins asking, "Are you a poor reader? Do you tend to go to sleep when you read? Do you often do or say exactly opposite what you mean?", etc., the patient may well believe the questions are coming from a crystal ball. The patient often will not discuss poor reading ability, doing things backward, etc., simply because he believes that he's "just not as smart as others." As the discussion continues, the patient realizes that this doctor understands him and his condition better than anyone ever has. The doctor/patient rapport becomes solidified; this is important in maintaining follow-through with the patient for permanent correction of the condition. Perhaps even more important, it helps to insure that the patient will choose the natural approach to health care as his entrance into the health care system.

The symptomatic manifestations of switching seem to develop in patterns. For example, if an individual has reading, learning, and thinking problems, there will not be a significant amount of musculoskeletal disorganization. On the other hand, if there is significant musculoskeletal disorganization there will not be as many reading and reversal of thinking problems. Of course, some individuals may be switched to the point that there is significant interference with both processes. When reading body language and developing questions for the patient, consider the possibility of the symptomatic pattern gearing to the musculoskeletal or thinking processes. If neurologic disorganization has been present throughout a lifetime — and it often has — the individual will usually develop activities compatible with the more efficient functions of his body and mind. It would not be realistic to ask a lawyer who has apparently had neurologic disorganization since childhood if he has difficulty in reading. The fact that he got through law school indicates that this is probably not a great problem; however, musculoskeletal activity may be problematic. On the other hand, a cabinetmaker may have difficulty reading; he may almost be illiterate.

In the patient education field of neurologic disorganization, develop questions and discussions to give the patient positive feedback that lets **him know** that **you know** the problem.

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Chapter 10

Proprioceptors

Introduction

The proprioceptors, nerve reflexes, and neuronal pools to higher centers give marvelous intercommunication for organization of movement and the body's orientation in space. A vast amount of understanding and classification of the proprioceptors and the interconnecting nerve network has been accomplished by neurophysiologists. It appears that applied kinesiology has clinically added to the knowledge of the proprioceptive system to obtain change in functional disturbances.

The application of proprioceptive therapeutics has grown to include many types of function. The potential ramifications of this type of evaluation and therapy are indeed wide. Much has been said within the chiropractic profession regarding improper nerve control of various structures, organs, and glands. In some circles of chiropractic there is little or no recognition of improper afferent signaling. Indeed, there is significant evidence that improper signaling can and does come from peripheral receptors to cause disorganization and consequent functional health problems within the body. The English version of *Gray's Anatomy*[28] states that ". . . . it is physiologically necessary to consider **arrays** of several types of sensory endings which act in concert to provide information about the forces and influences acting at a particular locality to be analyzed together in the central nervous system." The complexity and interaction of reflex activity defies total understanding with current levels of electrophysiology ability. Although much greater understanding has developed in just the last ten years on the interactions of reflexes, Bachwald[1] helped place this complexity into perspective. "In considering reflex activity, even a seemingly simple event such as the monosynaptic response which results from projection of a sensory fiber onto a motoneuron must be viewed as a product of the whole nervous system, and not of just one isolated input-output pathway." She points out that in an effort to understand the processes, we strive for simplicity and clarity which overlooks the continuous interaction and integration inherent in the system. On each spinal cord motoneuron, there are approximately 6,000 synaptic terminations.[4]

It appears that the approach used in applied kinesiology of evaluating the body's reaction to stimuli is indeed an effort which has substance. It evaluates all of the interactions within the body. The effort is directed toward finding the signaling mechanism which is causing dysfunction and eliminating its source to return the body to predictable organization. Thus the effort directed to the proprioceptors is to locate and eliminate stimulation which causes volleys of impulses that are misdirected in the neuronal pools.

Goodheart[7] described methods of working with the Golgi tendon organ and muscle spindle cell to strengthen and weaken muscles. His hypothesis was predicated on an injury to the neuromuscular spindle cell or Golgi tendon organ causing inappropriate afferent impulses on a lasting basis. Treatment is a specific manual manipulation to the proprioceptor group which is apparently malfunctioning. He and others have contributed to the applied kinesiology hypotheses of proprioceptive function based upon considerable experimental evidence supportive of the hypothesis. This clinical application of treatment has been applied to a wider and wider range of clinical conditions wherein aberrant proprioceptive input seems to be involved.

Many conditions that were at one time classified as switching, or unpredictable disorganization, are now recognized as improper signaling from proprioceptors located in the muscles, tendons, joints, skin and fascia, or those for orientation in space.

Sherrington[23] classified proprioceptors as those end organs which are stimulated by actions of the body itself. They are somatic sensory organs located at strategic points to secure inside information and effectively bring about cooperation and coordination among muscles. The proprioceptors may be classified into three groups: the muscle proprioceptors, proprioceptors of the joints and skin, and the labyrinthine and neck proprioceptors.[8] Each group has within it members capable of phasic or tonic activity.

The muscle proprioceptors consist of the neuromuscular spindles and the Golgi tendon organ. The neuromuscular spindles influence the muscle in which they reside, and its synergist and antagonist muscles. The Golgi tendon

organ is inhibitory to the muscle in whose tendon it resides.

The joint and skin receptors are of multiple types and give joint position, cause facilitation and inhibition of postural muscles, and are hypothesized to play a significant role in disturbances caused from extraspinal subluxations. The skin receptors, in addition to responding to touch, pressure, pain, etc., are influential in muscle reflex actions and help give position sense.[10, 11, 19, 20]

The labyrinthine and neck receptors are of great importance in the structural balance of the body and orientation in space. Understanding the mechanism of these receptors and their influence on postural organization gives greater understanding of the apparent mechanism of vertebral fixations, upper cervical orientation with the skull, and cranial/sacral dysfunction, which are all sometimes responsible for structural imbalance within the body.

Muscle Proprioceptors

Neuromuscular Spindle

Neuromuscular spindles are located throughout the muscle, with a higher concentration in the central belly portion. The concentration of neuromuscular spindles is dependent upon the type of muscle in which they are located. Evidence from histologic study of the cat gastrocnemius shows that there are relatively few per muscle; therefore each spindle of necessity must be exquisitely sensitive and simultaneously exert strong influence on the neuronal pools.[22] In the postural (tonic) muscles, they are less concentrated, while having higher concentration in the muscles of more precise control (phasic).

The function of the neuromuscular spindles is entirely on a subconscious level, giving no sensory perception. They have both afferent and efferent nerve communication. The communication they send to the spinal cord and cerebellum is necessary for control of the muscle in which they reside, as well as for integration of the muscular system in general.

The muscle spindle varies in length from 2-20 mm. and is enclosed in a sheath, making a fluid-filled cavity. Within the cavity are 3-10 small muscle fibers which are called intrafusal to differentiate them from the larger skeletal muscle fibers, which are called extrafusal. The intrafusal muscle fibers are significantly smaller than the extrafusal fibers (from 10-25% smaller), and do not contribute to the strength of the skeletal muscle. The intrafusal fibers are attached to the extrafusal muscle sheath so the intrafusal fibers are stretched or shortened with the extrafusal fibers.

The extrafusal skeletal muscle fibers receive efferent (motor) neurons from the ventral horn of the gray matter in the spinal cord, or motor nuclei of the cranial nerves. These are approximately 70% of the motor fibers to the muscle and are large fibers, classified as alpha motor neurons. The balance (30%) are gamma motor neurons which give efferent supply to the intrafusal fibers of the neuromuscular spindle.

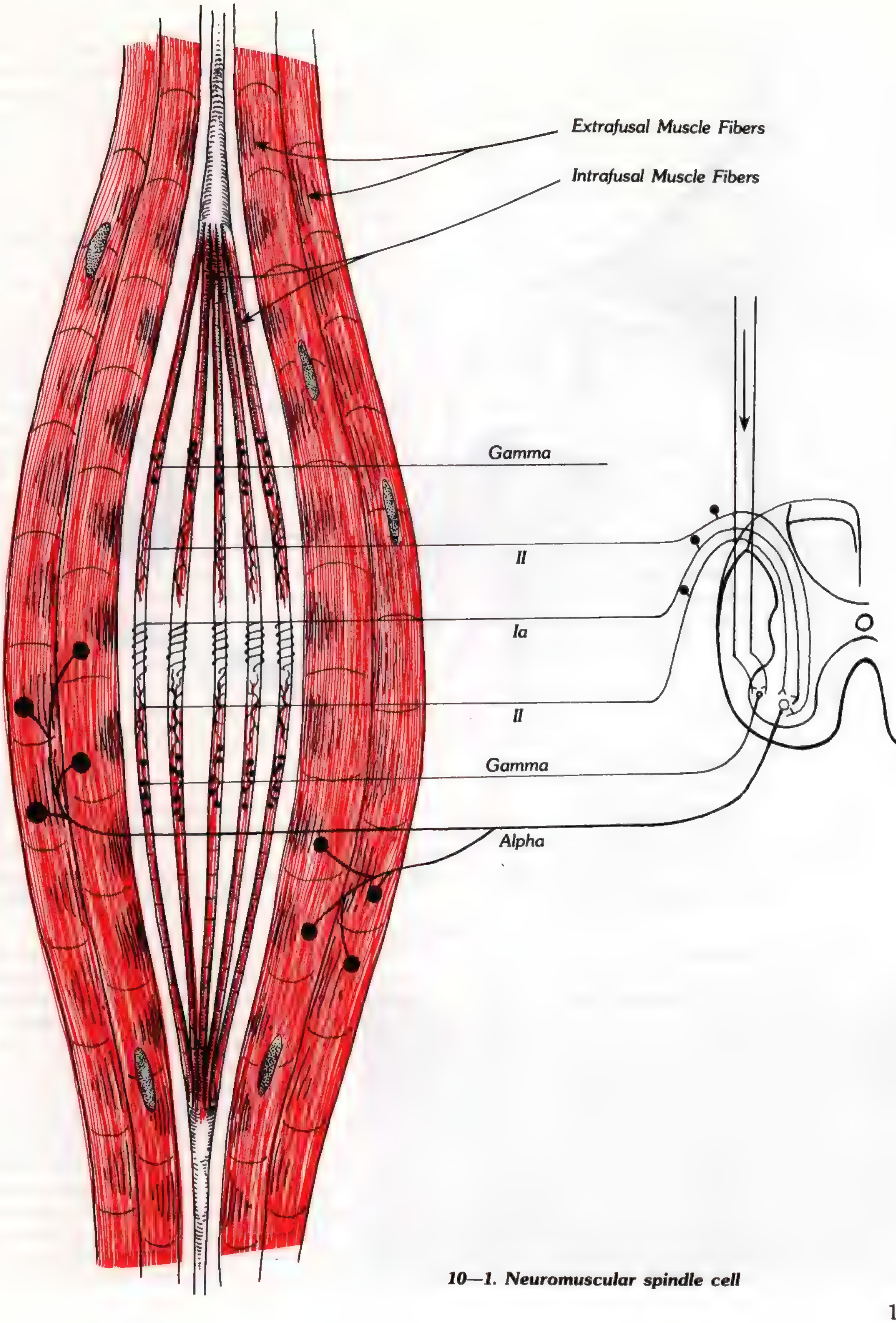
The central portion (called the nuclear bag) of the intrafusal fibers has either no or few actin and myosin filaments, and consequently does not contract. It is here that the sensory receptor area is located. It is supplied by two types of afferent nerves — one, type Ia which is located around the nuclear bag, and usually two of the type II fibers in the contractile part of the intrafusal fibers. The Ia fiber is large and has a high velocity of conduction, while the type II fiber is significantly slower. The primary (Ia) attaches by curling around the central portion of the intrafusal fiber. The secondary (II) afferent fibers are interdigitating with the myofibers.

There are two types of response which take place when the muscle spindle is stretched. There is a prolonged response referred to as tonic, which takes place for several minutes, from the stretched stimulation of the secondary receptors. This is roughly interpreted by the spinal cord as the magnitude of change. The primary receptors also have a similar response but are phasic, having a much greater response while the muscle is actually lengthening. As soon as the movement stops, the impulse decreases dramatically. This is interpreted as the rate of change by the spinal cord. When the receptor area shortens, there is a decrease in the impulse output from the primary afferent. As soon as the shortening ceases, the impulses re-appear.

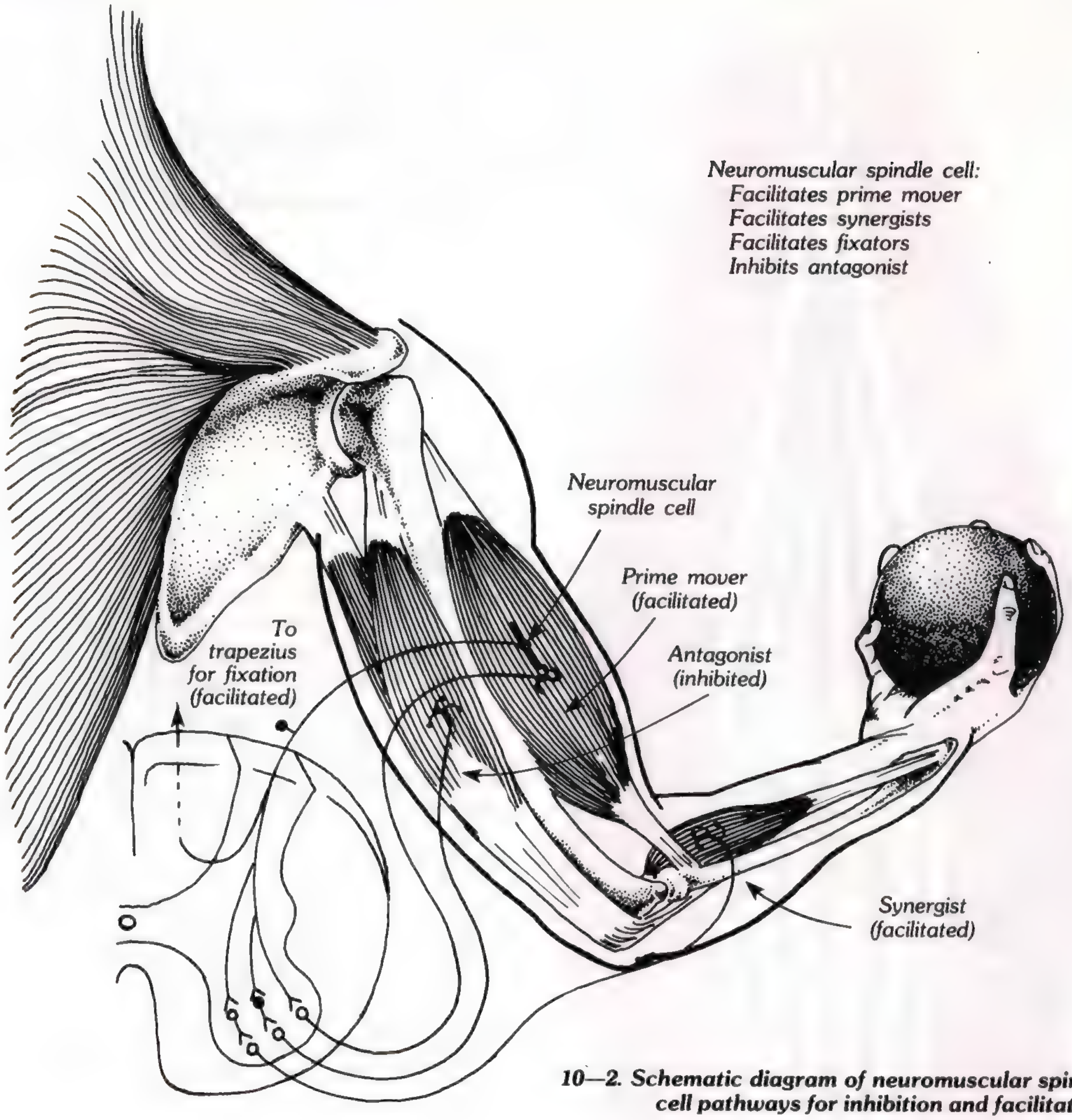
Any change of tension on the receptor portion of the intrafusal muscle fiber of the neuromuscular spindle causes an appraisal of the change to be sent over the afferent pathway. The change on the receptor area can be from contraction or elongation of the extrafusal muscle fibers, which in turn shortens or elongates the intrafusal muscle fibers. This takes place from stretching the muscle or contraction caused by stimulation of the alpha motor neurons. On the other hand, the receptor area can be stimulated from gamma nerve stimulation, causing the intrafusal muscle fibers to contract, thus stimulating the receptor area of the neuromuscular spindle cell. In effect, the muscle spindle acts as a comparator of the lengths of the two types of muscle fibers. There are normally sensory nerve impulses coming from the neuromuscular spindle all the time. Changing the length of the muscle either increases or decreases the rate of firing of the afferent nerve.

The stretch reflex is divided into two types. The dynamic stretch reflex occurs when a quick stretching of the muscle causes the neuromuscular spindle to be stimulated, and the monosynaptic reflex arc causes the same muscle to contract. An example of this is the knee jerk reflex. The static stretch reflex is from stimulation of the neuromuscular spindle from a slow and continued stretch of the muscle, causing a less intense reaction which causes the muscle to have an opposing contraction to the lengthening force.

The neuromuscular spindle controls smoothness of



10—1. Neuromuscular spindle cell



10—2. Schematic diagram of neuromuscular spindle cell pathways for inhibition and facilitation.

muscle contraction so that it does not oscillate and jerk in its motions. This correlates with the phasic muscles having a higher percentage of neuromuscular spindles than the tonic weight-bearing muscles of the body. The phasic muscles need more control because of their more intricate, dynamic capabilities. Regulation of muscle force is also needed to hold varying weights at specific heights. As additional weight is put on the extended arm, the neuromuscular spindle cell monitors the increasing weight and regulates the contracting force desired.

The neuromuscular spindle cell is responsible for the organization of the agonist with the antagonist, synergists, and fixator muscles. There is an excitatory effect on the muscle in which the spindle lies, facilitory effect on the synergistic and fixator muscles, and an inhibitory effect upon the antagonist muscles.

The effect of the neuromuscular spindle cell on the extrafusal fibers can be observed when the examiner stimulates the neuromuscular spindle cell on a normally functioning subject. The examiner may need to repeat the experiment several times because of the inability to precisely locate the neuromuscular spindle cells in the normally functioning individual. A major muscle of the body, such as the rectus femoris, is tested manually to determine its strength. The examiner then makes digital contact over the belly of the muscle with two points of contact a few inches apart. Digital pressure is then applied to the belly of the muscle, parallel with the muscle fibers, bringing the two contact points closer together. This appears to take tension off the intrafusal muscle fibers, causing a decrease of the afferent nerve impulse, which in turn causes temporary inhibition of the extrafusal fibers. The examiner immediate-

ly re-tests the muscle, and if the neuromuscular spindle cell was successfully stimulated, a weakening will be observed. If the stimulation to the neuromuscular spindle cell was significantly effective, the inhibition to the muscle will last long enough to test the muscle two or three times. The effect of the stimulation of the neuromuscular spindle cell can be immediately reversed by the examiner pulling the neuromuscular spindle cell apart.

Goodheart's hypothesis is that the neuromuscular spindle can become either hyperactive or hypoactive and cause erroneous information to be transferred through the simple oligosynaptic loops into the neuronal pools affecting this or other muscles. Support is given by the clinical change which is observed by manual muscle testing. It is unknown histologically what causes the neuromuscular spindle to malfunction. It could be injury to the spindle from overcontraction or stretching of the intrafusal muscle fibers, or trauma to the capsule of the spindle causing swelling of the spindle, with consequent mechanical pressures on the receptor area. It could also be a lack of gliding motion of the intrafusal fibers by an adhesion with the fibrous capsule, which is normally separated from the intrafusal capsules by a lymph space bridged by delicate septa.[2] The changes in the proprioceptor could also be a trained or learned response, as is seen in proprioceptive neuromuscular facilitation, an example of which is the conditioning a weight lifter does for greater power. In any event, the neuromuscular spindle cell which is at fault can be located and treated by applied kinesiology methods.

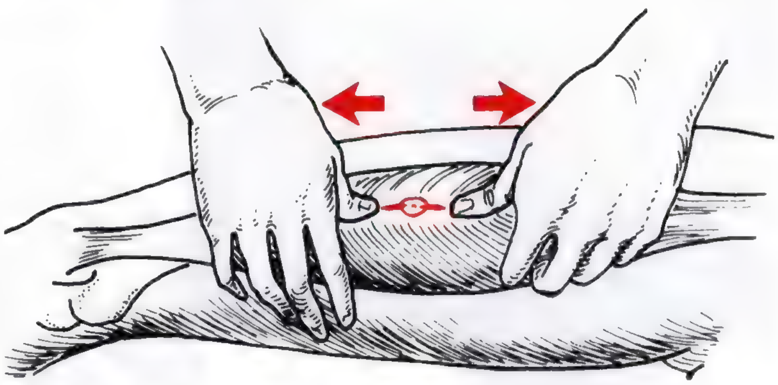
Examination and Treatment

The malfunctioning neuromuscular spindle cells appear to cause either muscular weakness or hypertonicity in the muscle with which it is associated, or to cause another muscle which is directly or indirectly related to weaken.

A dysfunctioning neuromuscular spindle cell is found by therapy localization. Positive therapy localization is found by trial and error methods until the exact location is found which causes a change in the suspected muscle. If a muscle is weak due to a dysfunction of a neuromuscular spindle, it will become strong when the involved spindle is therapy localized. This may result from tactile stimulation influencing the neuronal pools.[11] Neuromuscular spindle cell dysfunction follows the rules of therapy localization. A previously strong indicator muscle will weaken when there is therapy localization to the involved spindle cell.

When evidence suggests a dysfunctioning neuromuscular spindle cell, a nodule can usually be palpated which is considered to be the muscle spindle area. Locating it in this manner greatly reduces the time of finding its exact location for treatment. The area of the involved neuromuscular spindle cell will feel like a knot, or as fibrous tissue within the muscle belly. It will generally be quite tender on digital pressure, which also helps to locate it.

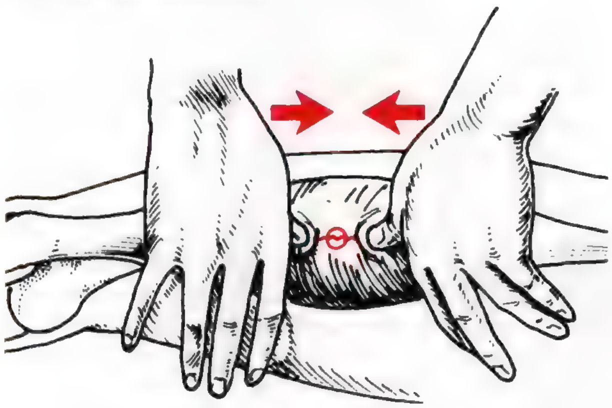
Treatment of a neuromuscular spindle, returning strength to a weakened muscle, requires contact directed to the vicinity of both ends of the spindle cell in alignment with the muscle fibers; pull apart on the neuromuscular spindle area. The pressure used is generally in the area of one to seven kilograms; however, a harder pressure may occasionally be needed. The traction on the spindle cell is done several times in the general area. Re-test the muscle; strength should be returned to normal and be of a lasting nature.



10—3. Direction of digital pressure to strengthen muscle which is weak from apparent neuromuscular spindle malfunction.

10—4. Representative location of neuromuscular spindle and pressure application for strengthening rectus femoris muscle.

To treat a muscle which is hypertonic as a result of an involved neuromuscular spindle cell, contact both ends of the spindle cell, and in alignment with the muscle fibers, push together on the neuromuscular spindle cell. The pressure used is generally one to seven kilograms, the same as above. It is more difficult to determine if adequate treatment was provided to a hypertonic muscle as the muscle, if returned to normal, will exhibit normal strength on manual muscle testing. The best way to determine whether the neuromuscular spindle cell has been adequately treated is to test to see if positive therapy localization has been abolished.



10—5. Digital pressure toward ends of neuromuscular spindle to weaken muscle.

10—6. Representative location for digital pressure on ends of neuromuscular spindle to weaken muscle. Press together.

When the neuromuscular spindle cell is influencing a remote muscle, it is called a reactive muscle. Generally the muscle in which the involved spindle resides will be hypertonic, and the reactive (remote) muscle will weaken immediately after the primary muscle is contracted. Occasionally therapy localization to the neuromuscular spindle of the primary muscle while it is being contracted will eliminate the weakening of the secondary or reactive muscle. The subject is covered more thoroughly under "Reactive Muscles," Chapter 11.

Golgi Tendon Organ

The Golgi tendon organs are located in the tendon close to the musculotendinous junction. A few to many muscle fibers are attached to each Golgi tendon organ, with an average of 10-15. The Golgi tendon organ is situated in series with the muscle, whereas the neuromuscular spindle is parallel to the muscle. The neuromuscular spindle monitors the length of the muscle, while the Golgi tendon organ monitors the tension of the muscle. Stimulation of the Golgi tendon organ is from contraction of the muscle, with stronger stimulation from greater contraction. The Golgi tendon organ inhibits the muscle with which it is associated. The tendon receptors have afferent nerve supply of the large group I. The neuron is similar to the group I afferent of the neuromuscular spindle and is differentiated as being Ib, while the neuromuscular spindle nerve is Ia. Transmission from the Golgi tendon organ goes to both local areas in the cord and through the spinal cerebellar tracks into the cerebellum. The local signal excites interneurons which in turn inhibit the anterior alpha motor neuron of its own muscle and synergists, while facilitating antagonists. The inhibitory nature of the Golgi tendon organ acts as a protective mechanism for the muscle. Many muscles have much greater strength potential than the structure can withstand. A failure of muscle control can cause possible avulsion or tearing of the muscle itself. Stimulation to the Golgi tendon organ inhibits the muscle from going past its structural capabilities. An example of the effectiveness of the Golgi tendon apparatus is observing individuals arm-wrestling. The loser generally gives out completely — all at once — when impulses from the Golgi tendon organ overpower the alpha motor neuron impulses and shut the muscle down. It is observed, however, that many trained weight-lifters apparently have learned to mentally override the Golgi tendon mechanism to provide a greater amount of strength potential. This can, of course, be structurally damaging to the body, as in the situation when an arm wrestler fractures the humerus.

There is evidence that the Golgi tendon organ, like the muscle spindle cell, can dysfunction, giving improper communication to the cord level and higher centers. This can cause the muscle with which it is directly associated to be either hypotonic or hypertonic, or to possibly influence other remote muscles.

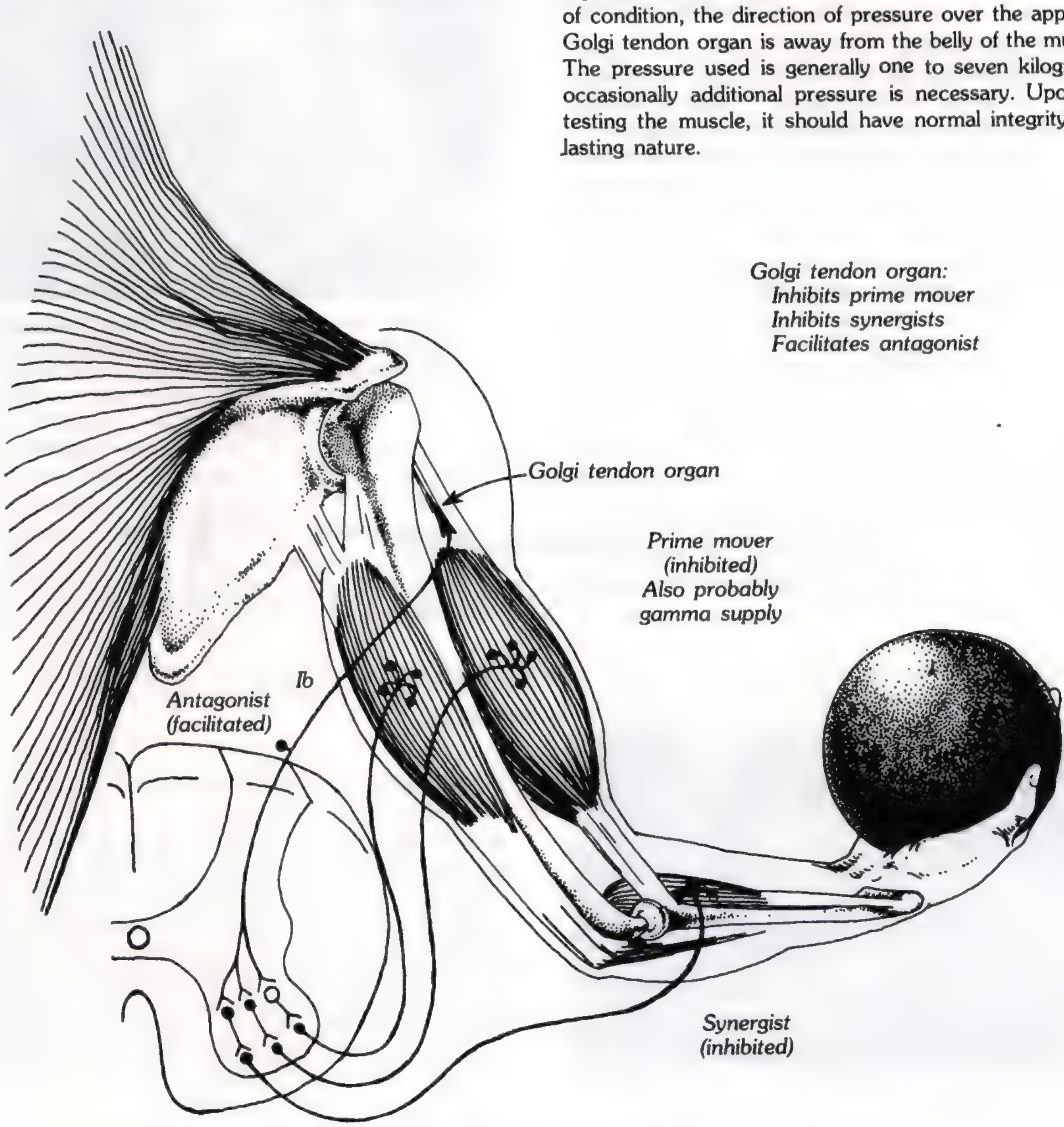
As on the neuromuscular spindle cell, the influence of manual manipulation of the Golgi tendon can be observed by influencing normally functioning Golgi tendon organs. The only difficulty in performing this experiment is in applying the manipulative force at the correct location. It requires excellent palpatory skills to find where the Golgi tendon organ is probably located, and a certain amount of luck that the receptor is actually there. This is necessary because a normal Golgi tendon organ will not therapy localize, revealing its location. To cause a strong muscle to weaken in a normal subject, digital pressure is applied over the probable location of the Golgi tendon organ in alignment with the muscle fibers away from the belly of the muscle. If the attempt is successful, there will be an immediate dramatic weakening of the muscle which will last from approximately a half-minute to several minutes. In attempting this experiment, a muscle should be selected

which does not have an extensive amount of tendon surface area, and the muscle should have adequate strength so that it is not easily overpowered. A good muscle to use is the rectus femoris of the quadriceps group. The entire quadriceps group is more difficult for achieving successful weakening because of the large area of origin of the muscles.

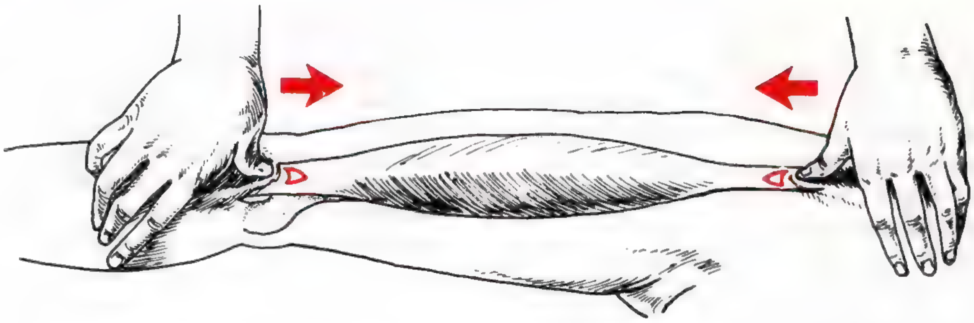
Examination and Treatment

The malfunctioning Golgi tendon organ is examined by therapy localization and treated in a manner similar to the neuromuscular spindle cell. Usually the location of the dysfunctioning receptor can be palpated as a discrete nodular area in the vicinity of the musculotendinous junction. With experience, this location is easily recognized and can be further identified by therapy localization. Have the patient therapy localize to the area, and then test the previously weak muscle. If the Golgi tendon organ has been located and it is at fault, the muscle will now test strong on manual muscle testing. The muscle can be involved at either the origin or insertion, or at both ends. Both should be evaluated if the origin and insertion are easily available for inspection. Treatment is accomplished with digital pressure of a tractioning type, linear with the muscle fibers in a direction toward the belly to strengthen the muscle. The amount of pressure used is generally one to seven kilograms, and the pressure is repeated several times.

It is sometimes clinically observed that a muscle seems to be overactive as a result of Golgi tendon organ malfunction. This is not a common finding. Neurologic understanding of this mechanism is speculative. For treating this type of condition, the direction of pressure over the apparent Golgi tendon organ is away from the belly of the muscle. The pressure used is generally one to seven kilograms; occasionally additional pressure is necessary. Upon retesting the muscle, it should have normal integrity of a lasting nature.



10—7. Schematic diagram of Golgi tendon organ pathways for inhibition and facilitation.

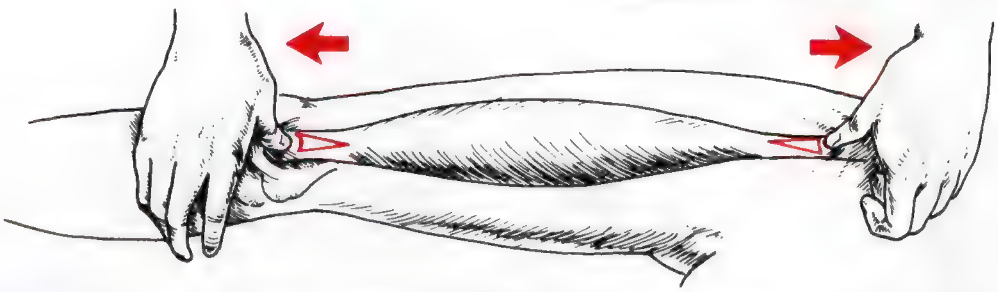


10—8. Direction of pressure over Golgi tendon organ to strengthen weak muscle.

10—9. Contact point for strengthening rectus femoris from apparent Golgi tendon organ malfunction.

The Golgi tendon organ also appears to cause weakness in remote muscles of a reactive nature. The remote muscle will weaken immediately after contraction of the muscle which is involved with a dysfunctioning Golgi tendon organ. Treatment is directed to the Golgi tendon organ. This technique of evaluation, its ramifications, and treatment is discussed more thoroughly under "Reactive Muscles," Chapter 11.

Possibly many results from the early origin/insertion technique were, in fact, manipulation of the Golgi tendon organ. Even though a general manipulation of the Golgi tendon organ, such as that used in origin/insertion technique, is sometimes effective, there is definitely a linear quality to the Golgi tendon organ. Most effective results are obtained by applying the procedures stated here. Involvements associated with the origin/insertion technique are at the periosteal-tendinous junction and are more nodular and palpable, requiring a much heavier treatment pressure than the Golgi tendon organ dysfunction does.



10—10. Direction of digital pressure to weaken an apparent hypertonic muscle with Golgi tendon organ technique.

10—11. General location and direction of pressure for weakening hypertonic muscle due to apparent Golgi tendon organ malfunction.

Nutritional Treatment for Muscular Proprioceptor Dysfunction

The nutritional requirement for improper proprioceptor function is raw bone concentrate or nucleoprotein extract. Goodheart feels that phosphatase which is present in these substances is the responsible factor. Raw potato also contains phosphatase and appears to be effective in the Golgi tendon mechanism. Nutritional supplementation is indicated when there are many dysfunctioning muscle proprioceptors, or when the dysfunction of a muscle proprioceptor continues to return.

Generally it is noted that an experiment can be accomplished in which the muscle proprioceptors of a normal individual are influenced, weakening the associated muscle. This can be immediately reversed, strengthening the muscle, and repeated as many times as desired. Usually chewing raw bone nucleoprotein extract or concentrate will override the ability to produce the experiment and will also lock in a correction so that it cannot be reversed.

Joint and Skin Proprioceptors

Various reasons for stimulation to the proprioceptors of the joints appear to be responsible for many responses observed in applied kinesiology on manual muscle testing. Clinical evidence indicates that when there are subluxations or various types of strains in the joint, there is an adverse influence on muscle activity. The joint can be evaluated by different AK methods to determine if there is normal function and, if not, what the apparent cause of the dysfunction might be.

There has not been recent study and documentation in the literature of the proprioceptors of the skin regarding their integrative function with the rest of the nervous system. Although additional research is necessary, clinical evidence in applied kinesiology indicates that there is a more important role for the skin proprioceptors than that generally attributed to them.

Certain skin reflexes, described later, have been clinically effective in applied kinesiology in changing function. These remote reflexes were empirically developed by various individuals. Their mechanism of action is unknown; possibly the communication may be from the unfolding of ectodermal tissue as the skin and nervous system are developed.

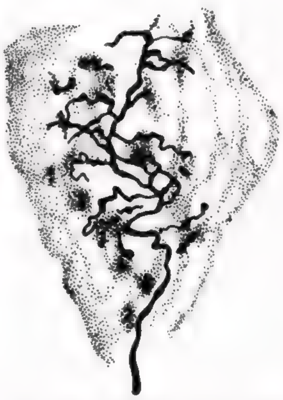
Included in this discussion are the proprioceptors associated with the fascia. These proprioceptors are not histologically well-demonstrated, and little recognition is given to proprioceptors in the fascia in the literature although they were discussed in relation to manipulative therapy as early as 1902 by Still.[25]

More is known about the role of the joint proprioceptors regarding position sense for orientation in space. There has been little study of the correlative action of the proprioceptors of the skin and fascia with those of the joints. It seems reasonable that there is comparative analysis of the afferent impulses supplied by the various receptors. If, for one reason or another, certain receptors provide improper signaling, the comparative analysis of body position and action could create confusion in the higher centers. This might explain why there is, observed on a clinical basis, a general affect on the muscular system when a joint, muscle, or skin area apparently dysfunctions.

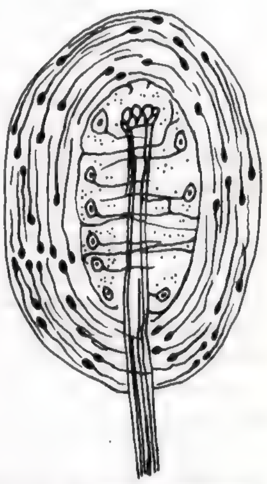
JOINT RECEPTORS

Joint receptors are extremely important in the position sense of the body. They vary somewhat but tend to be of the Pacinian corpuscle, Ruffini's end organ type, or free nerve endings. Ruffini's end organ is of a spray-like construction found in joint capsules and other connective tissue, as well as in deep fibrous tissue of the corium. In the joint, they are slowly adapting flower spray receptors with terminal branches of an axon, formed loosely and encapsulated, not like corpuscles arranged in groups. They signal joint position and may be sensitive to warmth. They are supplied by group II neurons.

Pacinian corpuscles are located near joints and tendons and in the palmar aspects of the hand and plantar aspect of the foot. They are also found in the periosteum, interosseous membranes of the forearm and leg, and in the deeper parts of the dermis. Pacinian corpuscles are the



10—12. Ruffini's end organ



10—13. Pacinian corpuscle

largest of the joint and cutaneous receptors; they may be up to 2 mm. in length. The corpuscle consists of a laminated capsule containing a nerve terminal. They are fast-adapting receptors whose adequate stimulation is pressure or vibration. They are supplied by group I sensory neurons.

A very minimal change of joint position (2°) will alter the discharge rate of the joint receptors. The Ruffini endings — being slow to adapt — give position sense, while the Pacinian corpuscles — being more reactive to change — are more specific for change of position. At any position of the joint, some receptors are under stimulation; others are at a higher stimulation rate; still others are quiet.

Joint receptors have an important role in body organization. Afferent neurons connect with interneurons in the spinal cord and have a wide distribution, having a significant influence on ipsilateral and contralateral muscles and organization within the gait mechanism and general structural balance.

An extraspinal subluxation is described by most as an articulation which is not in its juxtaposition, or has aberrant movement through its range of motion. It seems reasonable, then, that a subluxation would inappropriately stimulate some of the proprioceptors regarding the joint position and movement. If, in the cord and higher centers, there is comparative analysis of the prodigious afferent supply, it would appear that confusion would develop in the neuronal pools, and would ultimately create dysfunction of the target areas destined to receive these signals. This could explain why a subluxation of an extraspinal articulation can cause abnormal muscular inhibition (or facilitation) remote from the subluxation, as well as the area of subluxation. Support of this hypothesis is derived from the change observed in muscle function on manual muscle testing in applied kinesiology. For example, a subluxation of the cuboid in the foot can cause weakness of the thigh adductors or of the tensor fascia lata. In essence, it appears that the body becomes confused because the cuboid, being malpositioned, stimulates the proprioceptors inconsistently with the position of the foot. Correction of the subluxation immediately returns the weakened muscle to its normal state, as observed on manual muscle testing.

The subluxated articulation may not cause a muscle to be weak when simply tested, which is known as weakness "in the clear." Elicitation of weakness may require movement of the articulation or placing a shocking force into the articulation. Weakness associated with the shock appears to correlate with the Pacinian corpuscles, which are fast-adapting; weakness in the clear associates with the Ruffini end organs, which are slow to adapt to stimuli.

Walking and other routine activities require a large amount of integration. This integrated action is accomplished by information developed from stimulation of proprioceptors and integrated throughout the body by way of the neuronal pools. Thousands of proprioceptors in the lower extremities communicate information to the upper extremities and trunk during walking through the intersegmental propriospinal pathways. If there is a subluxation of the foot or another area, the proprioceptors send erroneous information into the neuronal pools which would cause facilitation and inhibition of the shoulder flexors and extensors at the wrong time during the phases of walking. Because of disharmonious shoulder motion, the individual develops shoulder pain, possibly tension in the neck muscles, etc. Routine orthopedic examination of these symptomatic areas may show no involvement other than muscular tension. Muscle testing also may show no problem. The involvement can frequently be found by having the patient stand, which brings the foot and other structures possibly at fault into the examination. Several muscles of the shoulder and neck may now show weakness on manual muscle testing.

Nicholas et al.[17] studied the effect of conditions of the lower extremities on muscle groups, which included tests of the hamstrings-quadriceps, hip flexors, and hip abductors-adductors. The conditions were grouped as follows: the ankle and foot, back, knee ligamentous instability, interarticular deficit, patellar group, and arthritis group. Using quantitated muscle tests, they found muscle weakness distal from the injury site on a statistically significant basis. For various reasons, they recommended the back and arthritis groups be eliminated from the study. Further study on a manual muscle testing comparative basis revealed a similar outcome; however, they point out that what is measured by manual muscle testing cannot be measured by the Cybex II alone. (This will be discussed later in this section.)

Shock Absorber Test

The articulations of the body should be capable of accepting a mechanical shock without a detrimental effect. The mechanical shock should be recognized by the nerve receptors and interpreted in the proper perspective by the body. When there is a subluxation, a shock stimulates the receptors in a manner that the nervous system cannot accept, which causes confusion as the information arrives at the spinal cord level and is further distributed to higher centers. This confusion will temporarily cause inhibition of any or all of the skeletal muscles as observed on manual muscle testing. This generalized weakening is referred to as the weakening of an indicator muscle. After the subluxation has been corrected, the mechanical force directed into the articulation will no longer cause the generalized inhibition, because the receptors now accept the information of the shock and appropriately process it.

The shock absorber test can be applied to any freely-moving articulation, and most of the articulations with limited movement. One method of application is to simply solidly strike the foot, hand, etc., to transmit force into the articulation being tested. Generally, a single striking force is effective in eliciting the muscle response. While in most cases a positive shock absorber reaction will cause a change observed in any skeletal muscle, it is best to test muscles directly related with the articulation, or those having direct association with the tested articulation's activity.

Usually, the striking force can be applied in a general manner. A quick, shocking-type force gives the most significant muscle reaction. When there are numerous articulations potentially involved, shocking forces in various vectors may be necessary to elicit a response. If the shock absorber test is used as a screening device, a

subluxation may be missed by improper application. For example, the foot has many articulations which could potentially be subluxated. A general shock to the plantar surface of the foot may not cause a shock into the metatarsals, calcaneus, etc., which are subluxated. The cuneiforms, navicular, and talus — which are not subluxated — may receive the brunt of the shock. The test would fail to reveal the subluxation. The shocking force which best screens the articulation(s) for subluxations is discussed in Volume IV with the orthopedic considerations of each articulation.

Challenge Mechanism

Another type of physical force used in applied kinesiology to evaluate subluxations is the challenge mechanism. Challenge of an articulation differs from the shock absorber test in the type of physical force applied to the articulation. Challenge is a force designed to push one portion of the articulation into a different relationship with the other aspect. It will either increase or decrease the severity of the subluxation.

Challenge was introduced in the section on spinal column subluxations. Challenge to the articulations not relating directly to the spinal column or cranium operates in a different manner. In the spinal column and cranium, there is a rebound effect which is not present in extraspinal subluxations.

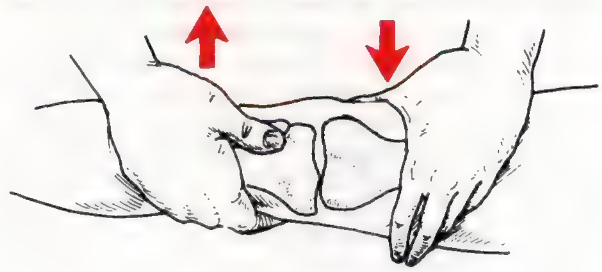
In extraspinal subluxations, the challenge mechanism appears to make use of the body's recognition of normal and abnormal stimulation of its joint receptors. When there is no subluxation of the articulation, varying vectors of force can be applied to the bones of the articulation and there will be no detrimental effect. When a subluxation is present, a challenge will influence the results of manual muscle testing. The muscle being tested can be classified two ways: (1) a muscle that appears to be directly influenced as a result of the subluxation, and (2) an indicator muscle, a muscle not directly involved with the subluxation but which gives information by change in strength when the general nervous system is apparently influenced by the challenge mechanism.

If a force is placed on one of the bones of the articulation (the other bone may possibly need stabilization) in such a manner that it improves the position of the subluxation, the joint receptors appear to be relieved of improper stimulation. This allows a muscle which was weak as a result of the subluxation to regain its normal strength as observed on manual muscle testing.

Thus challenge, returning normal strength to the associated muscle, gives information regarding the exact vector in which force is necessary to make correction of the subluxation. The challenge will only temporarily improve the muscle strength. It will last long enough for the doctor to test and observe the improvement for evaluation purposes. The subluxation usually requires a manipulative effort by the physician for lasting correction.

Occasionally a challenge can be corrective and the articulation will not need a forceful manipulation. This, of course, is not common and probably equates with a subluxation which is minimal, or to which the body has not adapted.

It will be observed, with slight changes in the vector of challenge, that there will be one specific vector which causes maximum improvement in muscle strength. This vector appears to be the best for correction of the subluxation. Any technique with which the physician is familiar, which can be applied to this vector, is adequate for effective manipulation. In some instances, the corrective approach indicated by the challenge requires an adaptive,

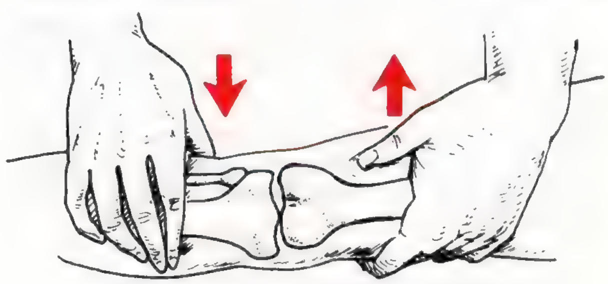


10—14. Pressure in the direction of the arrow will improve the position of the subluxation and strengthen a muscle which is weak because of the subluxation.

innovative manipulative approach by the physician because there is no standard technique to make the manipulation.

If the challenge is directed to the articulation so that it increases the subluxation, there will be an immediate and dramatic weakening of general indicator muscles of the body. These are muscles which were previously strong and do not have a direct relation with the subluxation. It seems that this gross, temporary effect is the result of general confusion within the neuronal pools, causing the body to generally malfunction as observed on manual muscle testing, until the system re-organizes. The gross effect is usually observed on any major skeletal muscle; however, some muscles may escape the effect.

There are occasions when the evaluation of a subluxation by increasing the subluxation with challenge, observing the effect on generalized indicator muscles, is of value in determining correction. Usually it is best to evaluate the subluxation by directing vectors of force to determine which one improves the function of a muscle directly



10—15. Pressure in the direction of the arrow will cause an increase in the subluxated position, causing a previously strong indicator muscle to weaken.

associated with the subluxation. This may be difficult or impossible in some cases because pain, or some other factor, interferes with the testing process. In these unusual situations, the articulation is challenged to find the vector causing the greatest weakening of an indicator muscle. The articulation is then adjusted in the direction opposite the challenge. To reiterate, a non-spinal subluxation is adjusted in the direction of challenge causing an associated weak muscle to strengthen, or opposite the direction that causes a strong non-associated muscle to weaken.

A large part of the nervous system's organization is developed as the individual learns to crawl, walk, and further organize body function. It seems reasonable that if a subluxation develops after this organization is complete, the proprioceptors of the joints, muscles, skin, and balance mechanisms will not be in harmony with the subluxation. This may be the reason why increasing a subluxation's intensity by challenge causes a general effect on muscle activity, as observed by manual muscle testing. It seems reasonable that the nervous system does not know how to cope with the inappropriate impulses it receives from the proprioceptors associated with the malfunctioning articulation. Returning the body to its normal state of function — whether the treatment is to muscles, articulations, or whatever — helps return structural organization.

Fascia Receptors

In general, physiology texts simply mention that there are nerve endings with afferent supply in the fascia. Although little is said about their purpose, it seems reasonable that there is position sense derived from these receptors.

Some therapeutic approaches are strongly directed to the fascia and its integration with body function. Rolfing, as described by Ida Rolf,[18] is quite involved with balancing body structure and removing stress from the myofascia. The premise considers that lack of structural balance disturbs function. Traction on one area of the fascia may be distributed diversely in the body because of the integration of fascia throughout the body.

It seems obvious that the muscle and its fascial covering must be in harmony for normal function. If there is integrative action from the receptors of the fascia, a lack of myofascial harmony will create disturbance within the signaling system, creating further involvement as the central nervous system integrates the improper signals. Still[25] referred to the fascia figuratively as "the framework of life."

A therapeutic approach to the fascia, used in applied kinesiology, appears to give clinical support to the hypothesis that the nerve endings in the fascia are important to neuromuscular integration. A muscle which apparently is not integrated with its fascia will weaken immediately after being stretched. The technique of examining and correcting this is discussed under "Muscle Stretch Response," in Chapter 11.

Skin Receptors

The nerve receptors in the skin are both exteroceptors and proprioceptors. The exteroceptors are sensory nerve endings stimulated by the immediate external environment. There are many reflexes important to body integration which depend upon stimulation of the exteroceptors. Some of these will be discussed in their relationship with applied kinesiology in the next chapters. Included are neurolymphatic, neurovascular, foot and hand reflexes, and stress receptors.

The distribution of various types of receptors in the skin is extensive. Gowitzke and Milner[8] state that those responding to light touch, pressure, or pain function both as somesthetic exteroceptors and as proprioceptors. In the latter capacity, they initiate basic reflexes and contribute to the body righting reflexes. Their signals combine with those from receptors of joints and muscles to coordinate body movement. Cutaneous reflex pathways include both spinal and supraspinal loops, and, at least in some instances and to some extent, responses require an intact cerebral cortex.

Spinal cord reflexes from stimulation of the skin have been demonstrated by Hagbarth.[11] These are primarily for withdrawal purpose from a nociceptive stimulus. In another study[10] on decerebrate and spinal cats, he demonstrated that both nociceptive and non-noxious stimuli to the skin caused inhibition or facilitation of the motor neurons. There was also a dual effect from stimulating areas of the skin where both inhibitory and excitatory components were developed.

Afferent supply from the skin is necessary for function of an extremity. Twitchell[27] described Mott and Sherrington's determination that cutaneous afférence to the hand was necessary for purposive movement of a limb in monkeys. If the limb was completely deafferentated, it was virtually paralyzed even though the efferent supply remained intact. If only one dorsal root distributing cutaneous sensation to any part of the hand remained intact, little motor deficit occurred. If the muscle afference was sectioned, but the cutaneous afference left intact, little impairment of function resulted. This reveals the importance of the proprioceptors located in the skin. Twitchell made further studies of skin sensation in monkeys and demonstrated that the full use of grasping requires the integrity of at least one dorsal root distributing cutaneous sensation to the hand.

Montagu[16] primarily discusses stimulation of the exteroceptors and their influence on an organism. After convincing argument, he states that ". . . sensory stimuli at the skin level have to be interpreted at the cortical level, and the appropriate motor reactions initiated. The skin itself does not think, but its sensitivity is so great, combined with its ability to pick up and transmit so extraordinarily wide a variety of signals and makes a wide range of responses exceeding that of all other sense organs, that for versatility it must be ranked second only to the brain itself." After consideration of Montagu's convincing arguments of its importance, it appears that the skin has certainly not received the attention in physiology that it deserves.

Afferent supply is necessary for the development of the motor systems within the brain and spinal cord. Lassek[14] demonstrated that when the dorsal roots of the 2nd cervical through the 4th thoracic are sectioned, there is failure of a baby monkey to develop motor function of the arm. In this study, all of the proprioceptors are involved. Whether arm function could develop with just the skin receptors isolated is speculative.

Using applied kinesiology methods, Goodheart[6] has

clinically observed several functions of the skin receptors which have value in analysis and treatment of specific conditions. The literature gives meager attention to the exact mechanisms of skin proprioceptors and their role in body integration. Twitchell's demonstrations discussed above indicate that they contribute to the position sense and integration of prime movers, synergists, and antagonists.

Consideration of possible involvement of skin proprioceptors should be given any time a challenge is made to an articulation, whether it be spinal or extraspinal. Mechanical skin stimulation in the form of a challenge can influence muscle strength as observed on manual muscle testing. This is especially easy to observe over articulations which, when moved, stretch the skin considerably. To challenge the skin, grasp it between the thumb and a finger, lifting it away to pull or push for the challenge. This appears to differentiate the skin challenge from that of influencing a muscle or an articulation. Skin challenge can be done simply, with one hand picking up the skin and pulling or pushing it in a specific direction. If there is involvement of the skin proprioceptors, a muscle which is weak as a result of their dysfunction will strengthen. Correction is obtained by pushing or "adjusting" the skin in the direction of this positive challenge.

The skin can also be challenged using a previously strong indicator muscle if one directly associated with the involvement cannot be found. In this case, the positive challenge will be exactly opposite, and correction is obtained by pushing or "adjusting" the skin in the direction opposite that which made the previously strong indicator muscle weaken.

Gravity Effects on the Skin

It has been observed for some time that certain patients will reveal positive therapy localization to an area when standing, but not when lying supine or prone. This is often due to a foot subluxation, or some other weight-bearing structural factor of the body's integration. When these factors are ruled out, some patients still show a difference between the upright and lying positions. Positive therapy localization in these patients can be observed in the lying position if the patient will add an inferior traction to the therapy localization. This seems to be clarified by Goodheart's[5] observation that many patients, when in the prone position, develop a weakening of a previously strong indicator muscle when generalized inferior traction is applied to the skin over the posterior thorax, buttocks, and legs; yet a lateral or superior traction has no effect. It is interesting to observe that when the patient is put in a reverse gravity position of about 25° and left in this head-low position for about one minute, the inferior skin tractioning will have no effect. When therapy localizing, especially to various reflexes, acupuncture points, etc., it appears valuable to add inferior traction when the patient is in the prone or supine position if a positive finding was not observed. When the therapy localization changes to positive with the addition of inferior traction, it correlates with therapy localization which would be positive weight-bearing but not reclining.

The recommendation for a reverse gravity position has been held for Logan basic technique and various sacral and cloacal reflex techniques. It may be possible that improved clinical results were observed because of the effect of the anti-gravity position on skin receptors, which appear to recognize upright, lying, or anti-gravity positions.

Throughout this discussion of proprioceptors, the major point has been that afferent signaling throughout the body must be appropriate for optimum harmony of function. Much is unknown about the skin proprioceptors. Putting into perspective what is known leaves the probability that signaling from the proprioceptors of the skin can be in disharmony with those of the joint. When contact is made for correcting a subluxation, whether spinal or extraspinal, the physician's prevalent image is that the bone is being contacted for a manipulative effort. In reality, the skin and underlying structures are being contacted to move the bony structure. It is possible that the proprioceptors of the skin are disproportionate in their activity as compared with the proprioceptors which seem to be involved with the subluxation. If this disharmony does exist, the corrective effort for the subluxation will not be the appropriate effort for correcting the skin proprioceptors. The subluxation may be corrected, but a signaling problem from the skin remains. If this is so, improper signaling from the skin may be responsible for recidivism of the subluxation.

The differential diagnosis of challenge of the articulation and the skin on an extraspinal articulation is somewhat different from that for spinal involvements. Both will be described.

Challenge for an extraspinal subluxation in the usual manner, taking extra care not to excessively stretch the skin. Determine the direction of optimum corrective thrust. Next, challenge the skin around the articulation by lifting it between the thumb and forefinger, stretching it in various vectors. The direction in which the skin needs to be manipulated will be the direction that improves a previously weak muscle directly associated with the involvement. The muscle thought to be associated is generally in the vicinity of the skin area being tested, but not necessarily underlying the area. If a weak muscle is found that is thought to be involved with the area, various challenges can be administered to the skin to determine if strengthening develops. Corrective direction will be opposite that which makes a previously strong indicator muscle weaken.

If the skin proprioceptive involvement is in the same direction as the required adjustive thrust for the articulation, the articular manipulation will probably correct both. If the skin requires correction in the opposite direction, two manipulations will be necessary. First, adjust the articular subluxation, then manipulate the skin in the indicated direction. All therapy localization and challenge should be eliminated after the corrective attempts.

In the case of a spinal involvement, the indication for skin correction should be exactly opposite that indicated for the vertebral subluxation if both are to be corrected with the same thrust. This is because a vertebral subluxation challenge is exactly opposite that of extraspinal challenges. Indications for vertebral manipulations were discussed more thoroughly in Chapter 5.

There is a paucity of information about skin proprioceptors and their application in applied kinesiology. For

that matter, there is not much information about skin proprioceptors in the general neurologic literature. The hypotheses which have been presented in this section are functional on a clinical basis; they require more investigation to be put into perspective. There are times when challenging the skin and attempting to understand its function leave numerous questions. One of the primary purposes of this discussion is to recognize that there is involvement within the signaling system of the body from the skin. All mechanical therapeutic measures are administered through the skin, and its influence must be recognized.

Equilibrium Proprioceptors

Organization of the body by the equilibrium reflexes is extremely important in the total organization of body function. There are many techniques and evaluation methods used in applied kinesiology that appear to correlate with these receptors, reflexes, and their total integration with the many aspects of body function.

Activity in this area begins in the infant with the tonic labyrinthine reflexes (TLR) and the tonic neck reflexes (TNR). At this stage they are stereotyped in form, causing specific muscle reaction to various head positions. As development progresses, they act in conjunction with each other, emerging into the labyrinthine and neck righting reflexes which are much more sophisticated

As these mechanisms mature, they become a very important part of the body's orientation in space. It is necessary for them to integrate with reflexes and proprioceptive and exteroceptive information from other parts of the body. It is in part through these mechanisms that the body adapts to structural problems, such as a pelvic inclination, thoracic kyphosis, or lumbar lordosis, etc. All of this must be integrated with reflexes such as the positive support mechanism which has receptors in the feet.

Illustrating the great amount of integration, Guyton[9] discusses the force of air pressure on the anterior surface of the body, stimulating the exteroceptors of the skin when an individual runs. This stimulation supplies information that there is a force against the body besides that of gravity; consequently, a forward lean develops to resist this anterior pressure.

The tonic neck receptors have an influence on extremity function. This was demonstrated by Twitchell[27] when he was studying the effect of completely eliminating afferent innervation through the upper extremities in monkeys. With the efferent supply intact, only simple flexion and extension and associated movements of the limb were present. Destruction of the tonic neck reflex caused complete paralysis of the limb.

This group of proprioceptors, as well as others, is extremely difficult to research because of the extensive interaction. The tonic reflexes in the infant are easier to study because of their ready influence on body position with movement of the head and neck. As the reflexes become more integrated to become the righting reflexes, more difficulty develops because of interaction with a larger number of excitatory and inhibitory stimuli.

Attempts to isolate the reflexes for study in intact animals and humans, as well as those isolated surgically, have been done with great ingenuity. It must be recognized, however, that under laboratory conditions less than normal integration is being observed, even when dealing with the intact human or laboratory animal.

In a clinical situation, it is necessary to be able to evaluate why reflexes may be malfunctioning and where the improper signaling originates. The physiologic laboratory studies which have been done are a great asset in helping to understand where dysfunction may be located, yet they have not been applied to functional disturbances. As we progress through this and other volumes, clinical application of this neurophysiology in the form of testing procedures will be presented to determine what appears to be normal and abnormal.

Some methods of animal laboratory studies of the neck and labyrinthine reflexes are accomplished by the following procedures.[2] Excluding the neck reflexes requires immobilization of the neck in a cast to prevent movement of the head in relation to the trunk. This eliminates (or at least reduces) movement of the head so that as the animal's body position changes, it is assumed that tonic effects are due to labyrinthine reflexes. Another procedure is for the neck reflexes to be surgically eliminated by a section of the posterior roots of the first three or four pairs of cervical nerves.[15]

To exclude the tonic labyrinthine reflexes, the head of the animal is fixed in some suitable apparatus. The body is then moved on the head, giving indication that tonic effects result from the neck motion and not change of the head's position. Neurologically, the labyrinthine reflexes are excluded by destruction of the labyrinths or section of the 8th cranial nerve.

Considerable study has been done on the various reflexes and their influence on body function. Many of these experiments have been done on lower animals. It appears that human physiology is similar, at least having the vestigial activity operating under some circumstances.

Righting reflexes are generally considered immature ones which integrate to become the equilibrium reflexes. Even though the righting reflexes and tonic neck reflexes become much more organized and not obvious in the adult human as separate functions, the pathways remain and are apparently active under some circumstances. Hellebrandt et al.,[13] studying intact individuals, were capable of eliciting primitive reflexes when the individual was in a relaxed state, and in some instances the body or limb was suspended by various apparatuses to eliminate friction. An understanding of the various types of righting reflexes gives insight into some of the input to the equilibrium reflexes.

Labyrinthine Righting Reflexes

Various head positions stimulate the labyrinths, reflexly causing contraction of the cervical musculature to orient the head to gravity. This can be observed in a cat held upside down by its feet, causing the head to turn into proper relationship with gravity for the normal standing position. If the eyes (visual righting reflex) are eliminated by blindfolding, the action still takes place.

Body-on-Head Reflexes — "Thalamic" Animal

Stimulation of skin receptors when in the supine, prone, or side-lying position activates muscles of the trunk and limbs to right the body. This appears to be due to asymmetrical pressure on the body, causing the reflex effect. When a board is placed on the animal's body, and the pressure is equalized on both sides, there is a lack of inequality of pressure and the reflexes are inactive. This is supported by study of a labyrinthectomized dogfish.[2] When placed in water on its side or back, it swims in the disoriented position. This is because the water causes equal pressure on all sides. When the fish comes into contact with the bottom or sides of the tank, pressure is exerted unequally, and it immediately rights itself. The position in which an individual is lying modifies the exteroceptors which activate the motor neuron pools.[24]

Neck Righting Reflexes — "Thalamic" Animal

A side-lying animal having its head oriented with gravity will orient its body with its head because of stimulation of the neck righting reflexes. These reflexes obtain their stimulation from joint receptors in the cervical region. This will take place even if a board is placed on the upper portion of the body to equalize stimulation on both sides.

Body-on-Body Righting Reflexes

These reflexes receive their stimulation from skin receptors. An animal lying on its side with its head held down to the table, eliminating righting reflexes from the labyrinthine and cervical origins, will attempt to right the body from the asymmetrical pressure on the body.

Visual Righting Reflexes

A labyrinthectomized animal, when held upside down as described in the labyrinthine righting reflexes, will still orient its head with gravity if the visual mechanism is intact. If the animal is blindfolded, there will no longer be head righting.

It becomes obvious that the equilibrium and righting reflexes provide a considerable amount of input for organization in the central nervous system. Twitchell[26] states, "Wholly new and distinct reactions are not added at excessively higher levels of the nervous system, but more primitive reactions become modified and elaborated as the stimulus for their response becomes more discriminating." His thoughts correlate with the findings of Hellebrandt et al., showing intact primitive reflexes in the normal individual.

The proprioceptors in the neck play an important role in maintaining orientation in space and ability to function in a normal manner. Cohen[3] gave an anesthetic block to the dorsal roots of C1, 2, and 3 in monkeys and baboons which caused severe defects in balance, orientation, and motor coordination. The effects were on motor activity of the total body, rather than being localized to a particular structure or area. This gives indication that subluxations or other dysfunction of the upper cervical-occiput region can influence muscular function throughout the body.

The effect of the deep neck reflexes on the upper extremities was demonstrated by Stejskal[24] in an electromyographic study of the abductors (deltoid and supraspinatus), and the pectoralis major muscle. As expected, there was facilitation of the shoulder abductors and inhibition of the pectoralis major as the patient looked to that side; however, when there was forced rotation of the neck, the findings changed. This will be considered further under the section on PRY technique in Chapter 11.

The integration and use of these reflexes by the efficiently functioning body is very widespread. In another investigation, Hellebrandt and Waterland[12] studied individuals who exercised to the point of maximum fatigue. Their purpose was to describe overt behavioral responses under this type of stress. Part of the study depended upon Schaffer's[21] suggestion that control from the central nervous system shifts under stress from cortical to subcortical centers. Under these circumstances, it was presumed that the subjects would exhibit an orderly expansion of the motor response to meet the increased demands of the exercise. The experiment revealed head and extremity posturing, which appeared to be at the subconscious level; the subjects were not aware of the posturing after the session was completed. Following the series of experiments, the investigators postulated ". . . that the recruitment of reserve motor units under progressively increasing stress is contingent upon augmenting the sensory input, and that the latter is achieved through orderly pattern expansion via pre-formed synaptic arrangements of the motor neurons common to man and operative automatically in the absence of cortical interference." This may be why unusual structural patterns are found in applied kinesiology testing when there is an area of chronic stress.

It appears that the body uses an orderly patterned recruitment via pre-formed synaptic arrangements in an attempt to gain better performance. With increased clinical knowledge, these patterns seem to be revealing themselves as predictable disorganization rather than unpredictable, as previously thought.

Cloacal Reflexes

The labyrinthine, head-on-neck, visual righting, and other reflexes appear to correlate with cloacal reflexes. The cloacal reflexes are not described in standard physiology texts, but there is clinical evidence of their presence in the human. The word "cloaca" literally means "sewer," and in lower forms of phylogeny, it is the combined anal, urinary, and reproductive organ. It is thought to have centering reflex receptors for genital contact in lower forms of animals.

Watkins[29] observed that dermal stimulation over the medial aspect of the gluteus maximus causes a cow to move toward the stimulation, while dermal stimulation on the lateral aspect of the gluteus maximus causes the cow to move away. Several techniques used in chiropractic for spinal balancing apparently deal with this reflex. The Spinal Touch Treatment, Logan Basic, and other reflex-

type techniques are among these.

Several methods of evaluation have been developed in applied kinesiology which appear to evaluate the integration of the labyrinthine and neck receptors with other aspects of the body. These have developed into working hypotheses because of the excellent clinical response to improved body organization. These reflexes and their integration are more thoroughly discussed in the following chapter, with methods of examination and treatment.

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Chapter 11

Examination and Treatment Procedures

The procedures in this chapter deal primarily with proprioceptors and organization within the body. Most of them are very important when switching problems recur after a patient walks or runs, or has difficulty in performing specific activities.

Problems with specific activities are often observed in athletic endeavors. It is important to note that the action with which the patient has difficulty will not necessarily indicate the location of the problem. Many important movements in sports have a motion which precedes or coincides with the major activity. These motions are important because they bring the nervous system into proper facilitation for the major activity. For every difficult sport activity, it is necessary to evaluate both the motion itself and the preceding and coinciding activities of other portions of the patient's body. This is also necessary in the daily actions with which people have problems.

Another general problem discussed in this chapter — which has possible influence on athletes and people in daily activities — is integrated function from right to left, top to bottom, and about the vertical axis. Balancing, centering, or organizational problems may not be observed until the two sides or two sections of the body are tested together. When two areas are tested at the same time, additional factors of neuromuscular integration are examined. Many areas of disorganization are not found because body intercommunication is not tested.

A major theme of this chapter is the need to evaluate function in the manner in which an individual lives, works, and plays. The primary cause of a patient's condition is all too often missed because the examination is done in the position or circumstances in which he actually gains relief from symptoms. For example, an individual may develop severe headaches and low back pain as the day progresses; he gets relief upon arriving home and sitting or lying down. It should seem obvious that a potential factor of the symptoms is the weight bearing, ambulating position, because relief is gained when these activities cease. Yet an examination to find the cause of the problem may be conducted entirely on the physician's examination table, the position in which the patient gains relief.

Many applied kinesiology examination procedures should be done immediately after the patient performs the stress or activity which has created the problem. There are also procedures to simulate weight bearing, gait activity between the upper and lower portions of the body, etc. Other procedures evaluate how a specific motion will immediately cause a reaction in another area of the body.

Gait Mechanism

Walking or running is a very complex neurologic activity. Many physicians consider the ability to ambulate without gross limping, body sway, or discomfort "normal." The activity deserves much more thorough evaluation, because improper signaling can be responsible for symptoms remote from — and not necessarily coinciding with — gait.

Apparent disturbance in the gait mechanism can often be observed by manually testing six muscle groups; this is known in applied kinesiology as gait testing. These tests will find specific types of gait involvement, but many other factors can be involved with improper function. Following this section are various types of testing procedures frequently applicable to the gait mechanism.

Muscle facilitation and inhibition were discussed in Chapter 2. There was a demonstration of normal change in muscle strength observed in manual muscle testing by evaluating the shoulder flexors and extensors when an individual simulated different gait positions. It was stated that to satisfactorily perform the experiment, it is necessary

to have a normally functioning subject. It is not uncommon to attempt this demonstration and find abnormal flexion and extension inhibition. The reason could be pelvic, spinal, foot dysfunction, or many other things. The apparent problem area can often be found by having the subject therapy localize to various areas, and then repeating the shoulder muscle test while the subject maintains the simulated gait position. For example, if the reason for the improper gait function is improper sacroiliac function, therapy localizing to that area will return normal facilitation and inhibition to the shoulder flexors and extensors. It is not always possible to find the reason the experiment fails this way because possible causes are widespread. Lack of proper facilitation and inhibition could very easily be dysfunction of a proprioceptor — either in the muscle, joint, or skin, or those involved with equilibrium. In any event, after thorough evaluation of the patient and correction of abnormal findings, the gait mechanism should function normally. There should be appropriate inhibition and facilitation of the shoulder flexors and extensors with the different aspects of gait simulation.

A person's problem may be attributed to the gait mechanism by simply testing him immediately after he walks or runs. This is generally done when evidence of the involvement is not found with the usual approaches performed on the examining table. A typical situation is for an individual to have evidence of kidney involvement which may be manifest by laboratory and physical diagnosis. In applied kinesiology, the psoas and iliacus muscles are associated with kidney function. If the temporal sphenoidal line point (or some other AK diagnostic factor) indicates psoas involvement but the muscle tests strong, the next step is to evaluate the patient in a more dynamic manner. This can be accomplished by testing the muscle in a weight bearing position. It will often show weakness; if not, have the patient walk, or perhaps run. Immediately afterward, test for a change in psoas or iliacus muscle function. If the muscle then weakens, some type of stress or loss of organization is operational on that muscle when the patient walks or runs. The problem could be improper signaling as a result of involvement in the foot, knee, spine, etc. The logical approach is to then evaluate the gait mechanism and other functional factors presented in this chapter. The spinal column, feet, knees, etc., should also be evaluated in a dynamic manner.

NEUROLOGIC FUNCTION

The nervous system appears to control the gait mechanism at several levels. The most complex is volutional control from the cortex. Postural control comes from the brain stem, cerebellum, and spinal cord. Finally, there are reflexes in the brain stem and spinal cord. Pearson,[40] in his review of the gait mechanism, integrates more recent studies of the cat and cockroach walking mechanisms, which appear to be similar to man's. In his review, he discusses early discoveries by C. S. Sherrington and T. Graham Brown, and then relates the 1965 discovery of Russian workers M. L. Shik, F. V. Severin, and G. N. Orlovskii.

The first neurologic description of walking was by Sherrington,[45] who demonstrated on a spinal cat.* He stressed the importance of afferent impulses from the receptors in the extremity in initiating and coordinating gait movements. He explained the generation of leg movement by a series of "chain reflexes."

In 1911, Brown demonstrated that there were still rhythmic contractions of the leg muscles — similar to those occurring during walking — in spinal animals whose posterior nerve roots had been transsectioned. This indicated a control rhythm generator in the spinal cord which influences the walking mechanism. This is sometimes called a "flexor-burst generator." Both Sherrington and Brown agreed that there was intrinsic activity in the spinal centers responsible for inconscient gait rhythm, highly regulable by afferent nerve impulses.

The next significant discovery was by Shik et al., who demonstrated with decerebrate cats that an animal could be made to walk on a treadmill in a controlled manner. Electrical stimulation was applied to the locomotor region in the brain stem. With increased electrical stimulation and treadmill speed, the cat's gait stayed with the treadmill. When the treadmill was slowed and a weaker stimulus given, the animal slowed to a walk; with increased stimulation and treadmill speed, it accelerated to a run.

Further evidence of a control rhythm generator for gait in the spinal cord was provided by Sten Grillner et al. in Sweden. In spinal animals with sensory input eliminated by severed dorsal roots, they demonstrated that the rhythmic reciprocal pattern of activity in flexors and extensors of the cat's hind leg could still be generated. The temporal sequence of activation of different hind leg muscles was not altered by removing the sensory input from them. This indicates a rhythm generator in the cord, and also central mechanisms responsible for determining the order in which different muscles are activated.

Evidence of a central rhythm generator does not eliminate the importance of the afferent input of gait activity. Without this input, there is inability to adapt to terrain and otherwise modify performance in a regulated manner. For the decerebrate cat to adapt to various speeds of the treadmill, it is necessary for the stance phase of gait to decrease as the speed of the treadmill increases. This is accomplished by sensory input indicating that the hip joint is extended, and weight is reduced in the stance phase. When these conditions are met, the leg goes into the swing phase. Grillner et al. showed that preventing extension of the hind leg of a spinal cat walking on a

* An animal whose spinal cord has been severed below the brain stem to allow only reflex actions within the spinal cord, which are termed "third-level reflexes."

treadmill inhibits stepping of that leg. This seems to show the necessity for proper proprioceptive stimulation at the joints and in the muscles. Improper stimulation may cause a limb to be prepared for the swing phase, when the stance phase has not been completed. The possible ramifications of improper proprioceptive stimulation during gait seem almost endless.

Apparently, adaptation of the gait to variables of walking also comes from the proprioceptors and exteroceptors. Stimulation to the top of the foot during slow walking causes that leg to flex to a greater degree. This is important, for if an animal were walking and the top of its foot brushed a rock or some other obstacle, it would need to raise the extremity to clear it. Other receptors in the foot, when stimulated, cause facilitation of the extensors. This gives resistance to gravity forces by extending the lower extremities in a human, and is called the positive support mechanism. Still other receptors, when stimulated on the medial or lateral side of the foot, cause facilitation of ad- or abductors, maintaining control of lateral sway. This is especially important when turning a corner, walking at right angles to an incline, etc.

The existence of a central control rhythm generator in the spinal cord is of interest since it shows a relative degree of sophistication in the gait action without higher center control, even without sensory input from the extremities. This may be why an individual can appear to function efficiently on gait analysis, yet have problems interfering with organization throughout the body as often observed by manual muscle testing. Although there is considerable gait mechanism control from the cord level, the afferent input from the extremities and higher center control is of significant importance in total integration and coordination. Pearson states, ". . . another important function of the higher centers, particularly in mammals and birds, is to modulate the basic walking motor program in response to sensory inputs from receptors in the head, such as the eyes and the vestibular apparatus. The modulation of the motor program by inputs from the receptors in the head presumably functions not only to control the direction of walking, but also to help insure that balance and stability are maintained at all times."

GAIT TESTING

Goodheart[17] introduced the primary method for gait testing in applied kinesiology, and Beardall[4] later expanded it. Six gait complexes are tested, each representing a different activity in the gait mechanism. The procedure consists of testing two basic groups of muscles which function together in the gait mechanism. For example, contralateral hip and shoulder flexors are tested together. A test is positive when one or both groups appear weak when tested together, but strong when each group is tested separately. In order to have a positive gait test, each group must test strong independently.

Gait tests differ from the muscle tests usually employed in applied kinesiology. Here muscles are tested as a general group; no attempt is made to isolate a prime mover in the best possible manner, as is usually done in manual muscle testing.

The six tests are as follows: (1) contralateral shoulder and hip flexors, (2) contralateral shoulder and hip extensors, (3) contralateral shoulder and hip abductors, (4) contralateral shoulder and hip adductors, (5) contralateral psoas major and pectoralis major, and (6) contralateral gluteus medius and abdominals.

The gait mechanism may be tested by first testing each muscle group to determine its strength. If the groups are all strong, gait testing can be accomplished by testing the two appropriate groups together. If a gait involvement is present, one or both of the groups will test weak after testing strong individually.

In clinical practice, it is appropriate to begin by testing the two groups simultaneously. If either the upper or lower extremity weakens, the gait test may be positive. Prior to making that determination, however, the examiner must test each group individually to ascertain that it is strong. If there is weakness when the group is tested individually, the examiner must determine what individual muscle or group of muscles is not functioning properly and make the appropriate correction. Among other problems, there may be a vertebral subluxation, active reflex point, meridian imbalance, or cranial factor. When both groups test strong independently, gait testing can be resumed. Time can be saved by starting immediately with the gait testing. If both groups test strong when tested simultaneously, they will also test strong individually. In the case of negative gait testing, this saves the time of doing the individual tests prior to the gait testing procedure.

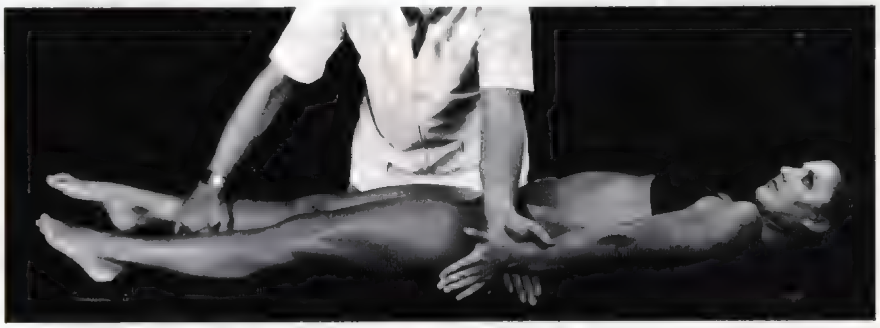
Contralateral Shoulder and Hip Abductors

The supine patient abducts his contralateral arm and leg, keeping the elbow and knee in extension. The extremities are abducted approximately 30°. A positive test is when one or both abductor groups weaken, but both remain strong when tested individually.

Contralateral Shoulder and Hip Adductors

The supine patient holds his arm and contralateral leg in adduction, with the elbow and knee kept in extension. The examiner attempts to abduct the arm and leg. The test is positive when one or both groups weaken with simultaneous testing, but remain strong when tested individually.

11—1. Contralateral shoulder and hip abductors.



11—2. Contralateral shoulder and hip adductors.

Contralateral Shoulder and Hip Extensors

This test can be done in either the supine or prone position. If done prone, the patient raises his leg in hip extension and the contralateral arm and shoulder, keeping his elbow slightly flexed. The examiner directs force anteriorly against the extended extremities. If there is a gait involvement, there will be weakness of one or both groups when tested together, but none when tested individually.

The test can also be done in the supine position. The patient attempts to hold the contralateral extremities against the table, while the examiner lifts the arm and leg in an anterior direction, attempting to flex the shoulder and hip. The supine position is convenient because five gait tests can be done this way, leaving only one test to be done in a seated position.

11—3. Prone contralateral shoulder and hip extensors.

11—4. Supine contralateral shoulder and hip extensors.

Contralateral Shoulder and Hip Flexors

The supine patient flexes his hip and shoulder, keeping the knee and elbow extended. His arm and leg are raised approximately the length of a normal step. The examiner directs force against the arm and leg in the direction of extension, testing the general muscles of flexion. If a gait problem is present, one or both of the muscle groups will test weak; they will not test weak when the group is tested individually.

Contralateral Psoas Major and Pectoralis Major

The supine patient raises his leg and contralateral arm into the positions for testing the psoas major and the pectoralis major. In this case the pectoralis major is tested as a general muscle, rather than individual vectors for the clavicular and sternal divisions as is usually done. As with other gait tests, a positive test is when one or both groups weaken when tested simultaneously; both remain strong when tested individually. This is the only gait test done in opposition.

11—5. Contralateral shoulder and hip flexors.

11—6. Contralateral psoas major and pectoralis major.

Contralateral Gluteus Medius and Abdominals

Ducroquet et al.[13] point out the importance of the gluteus medius in stabilizing the pelvis while a person walks. There is synergistic activity of the contralateral oblique and the rectus abdominis muscles. These are most easily tested with the patient seated. The examiner stands beside the patient and stabilizes the patient's opposite knee. The patient presses the knee closest to the examiner against the examiner's leg to activate the gluteus medius, while the examiner tests the contralateral rectus abdominis and oblique abdominals as a group. The experienced examiner can learn to feel the lack of pressure against his leg from the patient's weak gluteus medius. Usually a positive test is observed by weakening of the abdominal muscle group. In the presence of a positive gait test, the muscles can be tested in their usual manner on an individual basis to determine if they are strong.

11—7. Contralateral gluteus medius and abdominals.

CORRECTION

Abnormal gait function, determined by the above tests, appears to be associated with active meridian (acupuncture) points in the metatarsal area. It is interesting that the therapeutic approach clinically found in AK to affect the gait tests seems to be associated with the meridian system, rather than with proprioceptors. As discussed earlier, there is significant evidence of a central control rhythm generator in the spinal cord for the gait mechanism. Miller and Scott[38] propose a model of the spinal locomotor generator based entirely on the connections and properties of known spinal neurons. Their model seems reasonable, but it is possible that other factors are involved. It seems strange that treatment points affecting the combined muscles evaluated by applied kinesiology gait tests have the characteristics of the meridian system rather than those of the proprioceptors. Could it be that there is additional control given the spinal locomotor centers by the meridian system, which has been overlooked in Western research? Further research of the meridian system's influence on muscle function may clarify this point.

The meridian point associated with an abnormal gait mechanism will therapy localize and respond to standard acupuncture methods of stimulation as used in AK. There is often a foot subluxation in the general area of the active point. The metatarsals are especially involved. It may be that the subluxation developed first and caused the acupuncture point to be active. If a subluxation or general foot dysfunction is present, it usually requires correction for the permanent elimination of the active acupuncture point.

There are specific methods to determine if a point which therapy localizes is a meridian point or some other factor. The meridian system is discussed in Volume III, and foot problems in Volume IV.

Three gait complexes have meridian points located across the dorsum of the foot. The hip and shoulder adductors have points located lateral to the 5th metatarsal, while the shoulder and hip extensor complex has its point located close to the metatarsophalangeal articulation of the great toe, on the medial aspect. The point for psoas major and pectoralis major muscles is on the plantar surface of the foot.

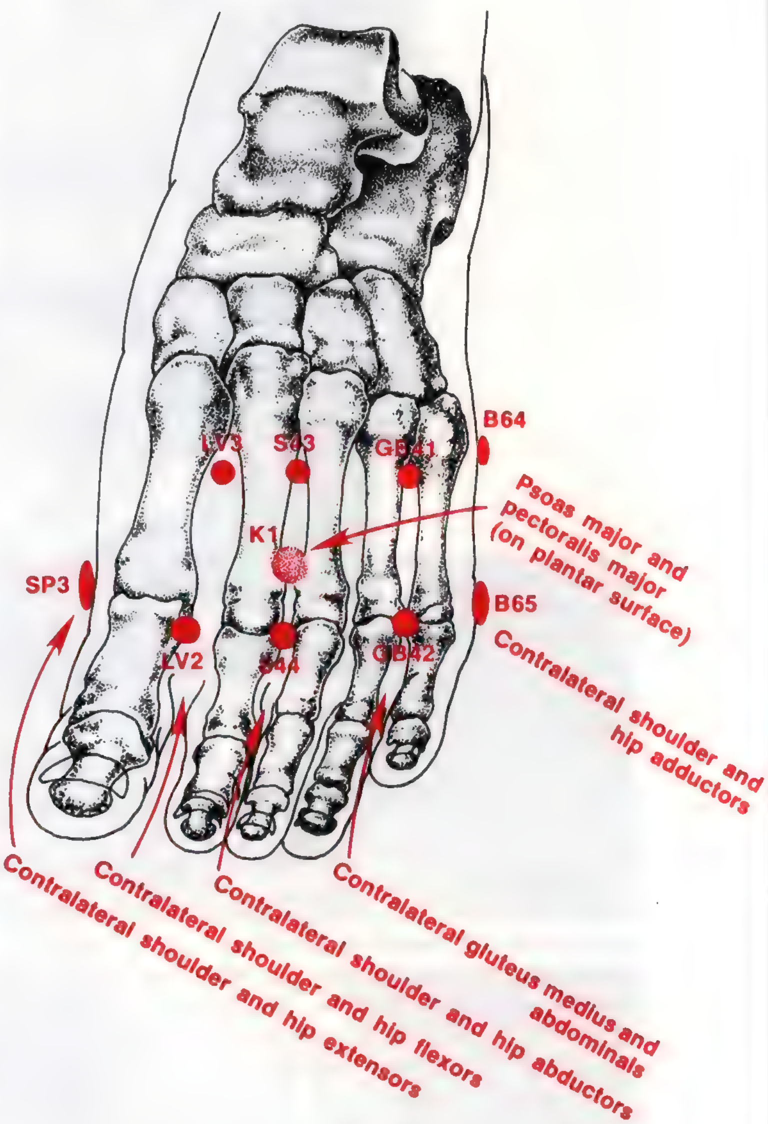
There are primary and secondary points for the three complexes located across the dorsum of the foot, and for the complex on the lateral aspect of the foot. The active point is found by therapy localization. The involvement will usually be at the primary point; if not, the secondary point should be evaluated. The active meridian point is usually palpable and exquisitely tender. Treatment is generally a rather hard, digital manipulation for approximately 15 seconds. After treatment, therapy localization to the area while testing a previously strong indicator muscle for weakening will identify any need for further treatment. After correction of the point, the foot should be evaluated for subluxations, proprioceptive dysfunction, etc.

Memory Key

A memory key to help remember the location of the meridian points correlates with the first five letters of the city Palo Alto, beginning on the medial side of the great toe:

P- posterior	=	Shoulder and hip extensors
A- anterior	=	Shoulder and hip flexors
L- lateral	=	Shoulder and hip abductors
O-oblique	=	Gluteus medius and abdominals
A- adductors	=	Shoulder and hip adductors

The remaining point for the psoas major and pectoralis major — K1 — is the only meridian point on the plantar surface of the foot.



11—8. Meridian (acupuncture) points for treatment of gait mechanism as observed by manual muscle testing. The large dots are the primary points, where the involvement is usually found; the smaller dots are the secondary areas to evaluate for involvement.

MISCELLANEOUS INVOLVEMENT WITH GAIT MECHANISM

It is difficult to categorize all the involvements possible with a gait mechanism problem. An interesting one is sciatic pain which increases with the distance walked but is not relieved by the cessation of walking.[23] Some very common involvements are temporomandibular joint dysfunction, recurrent cranial faults, and shoulder problems. Spinal involvement — such as subluxations, pain in the spine without subluxations, suboccipital neuralgia, etc. — may be secondary to a gait mechanism problem.

When there is recidivism of any problem for which correction was successfully accomplished, evaluating the gait mechanism is a realistic approach to finding the basic underlying cause. Many non-responsive patients have an involvement of this mechanism; however, it is frequently missed because the dysfunction is present only when the patient walks. The combination testing method described above is the first step in evaluating for gait problems. It may be necessary to perform additional tests, described later, or to test the patient immediately after he walks or runs.

Ligament Interlink

A clinical correlation of joint pain of contralateral upper and lower extremities has been observed in applied kinesiology. A method using this correlation has been described to reduce joint pain and improve function. Therapy is applied either to the joint having pain and dysfunction, or more often to the contralateral opposing extremity. In other words, if the difficulty is in the right arm, the treatment may be applied to the left leg.

When a quadriped walks, there is toe extension of the contralateral forelegs and hind legs during the stance phase, and flexion during the swing phase. This correlative motion can be observed through all the extremity joints, including the elbows and knees, shoulders and hips. The same motion is present in the biped, but it is less easily recognized in the distal articulations of the hand. When walking quickly in a relaxed manner, it can be observed that the wrist flexes and extends in unison with the contralateral ankle. The fingers also tend to flex and extend in unison with the toes of the contralateral extremity. It is easy to observe correlative activity of the contralateral shoulder/hip and elbow/knee articulations.

It is reasonable to assume that there is neurologic communication between similarly functioning articulations other than the reciprocal stepping and "mark-time" reflex[26] seen in the spinal animal. Proprioceptive communication of the joint position has been well demonstrated, as well as a flexor-burst generator discussed previously with gait mechanism. Clinical results indicate that communication between the contralateral upper and lower limbs has a greater effect than simply locomotion and position sense.

Goodheart[21] first observed the possibility of additional factors in the correlation of the contralateral upper and lower limbs in a patient with severe inflammatory swelling of the knees, caused by rheumatic fever. The patient could obtain relief in his knees by flexing his elbow; upon extending and stiffening his elbow, the pain became worse.

Applying this information to other conditions, it was found that positive therapy localization to an articulation could sometimes be observed when not previously present by simultaneously therapy localizing the contralateral articulation with compatible function — that is, a joint of the arm therapy localized with one hand, and a compatible joint of the contralateral leg therapy localized with the other hand. The correlation of the joints is: contralateral phalanges of the toes with the phalanges of the fingers, metatarsals with metacarpals, tarsals with carpals, knee with elbow, and hip with the shoulder. There also appears to be correlative function of trunk articulations, which will be discussed later.

This evaluation is done when there is no positive therapy localization, yet there is an apparent problem of the articulation. It is also used when there is a condition — such as a subluxation, carpal tunnel, etc. — which has been corrected but recurs. In this case, the two-handed therapy localization of ligament interlink is done immediately after correction has been obtained and there is no positive therapy localization at the articulation.

Two-handed therapy localization must be applied to comparative contralateral articulations. For example, if there is negative therapy localization of the wrist, it will be positive only by simultaneous contralateral ankle therapy localization. Simultaneous therapy localization to any other area of the contralateral lower extremity will nearly always fail to produce the positive therapy localization; if it does, the finding does not equate with the ligament interlink being discussed.

In an effort to find some factor which would interrupt the positive two-handed therapy localization, Goodheart applied manipulation and other therapeutic efforts to the articulation; this occasionally abolished the positive two-handed therapy localization, but it was ineffective in consistently improving the primary involvement. Continued efforts revealed that the positive two-handed therapy localization was interrupted if the patient opened his mouth. It appeared that a temporomandibular joint dysfunction might be involved in this pattern, since opening the mouth caused a change. Using all the known AK approaches for its evaluation, the temporomandibular joint appeared not to be involved.

Hyoid muscular balance also tested normal with usual

methods. However, when the hyoid was manually moved laterally, the positive two-handed therapy localization was interrupted. Goodheart hypothesized that stimulation of the proprioceptors of the hyoid musculature acted in some way to influence the neurologic crossover mechanism connecting these articulations. A system was developed to influence the painful condition, using the hyoid movement in conjunction with manual stimulation of one of the articulations.

Procedure

First, the painful articulation is evaluated by therapy localization. If positive, the usual AK approaches of manipulation, muscle balancing, etc., are accomplished to eliminate the positive finding. When there is no positive therapy localization of the area, it is therapy localized simultaneously with the appropriate contralateral articulation. Weakening of a previously strong indicator muscle is positive indication of ligament interlink involvement.

Positive therapy localization seems to correlate with the ligaments of the joint, usually at the most tender area. The two-handed therapy localization will generally be on corresponding ligaments of the articulation; for example, if the shoulder is involved and the painful area is on the anterior, the most likely positive therapy localization will be found on the anterior aspect of the shoulder and anterior aspect of the contralateral hip joint capsule.

Considering the arm held in the anatomical position, the lateral aspect of the elbow will correlate with the medial side of the knee. This is because in the anatomical position, the forearm moves anterior with elbow flexion and the leg moves posterior with knee flexion. In wrist, ankle, hand and foot correlation, the thumb side equates with the great toe, and the little finger with the 5th toe.

Bilateral therapy localization is generally easy to obtain. When evaluating the hand, the opposite hand can be used for the first therapy localization. This is maintained while the patient contacts the appropriate point on the contralateral lower extremity. It is best to have the patient lean forward so that he can contact the contralateral lower extremity while maintaining the first therapy localization. If the patient must lean forward to contact the lower extremity after the first therapy localization test has been done, two variables are introduced into the second phase of the test. One variable is the second therapy localization; another is flexion of the hips, spine, etc. It is possible to think one thing is being evaluated, when actually another is influencing the test because too many variables have been introduced into the procedure.

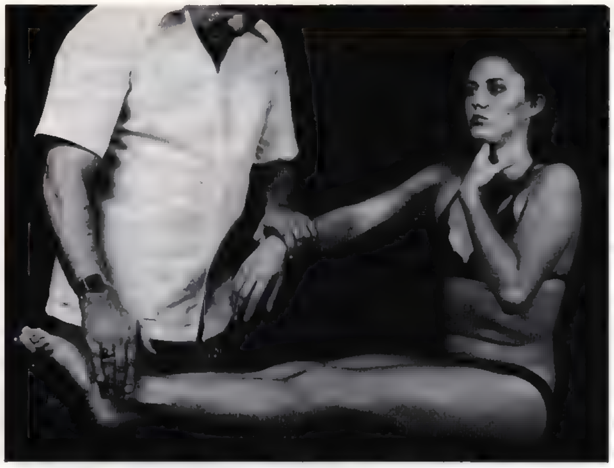
Ligament interlink testing can usually be done with the patient sitting or lying on an examination table. In some cases, it may be necessary to put the patient in a weight bearing or a gait position to obtain the necessary information.

The therapeutic effort is applied to the ligamentous structure of one of the two associated articulations. Therapy consists of intermittent digital pressure on the ligament(s) while the patient holds the hyoid toward the side of therapeutic manipulation. If the hyoid is not held laterally, the procedure is less effective.

To determine the side of treatment, the examiner evaluates by digital pressure for the less tender of the two points identified by the two-handed therapy localization. Digital therapeutic pressure is applied intermittently at that location. Generally, therapy will be applied to the arm or leg contralateral to the patient's pain location. On some occasions, the contralateral articulation may be more tender on digital pressure than the one about which the patient complains. If an individual is being treated for pain in the wrist and the contralateral ankle is found to be more tender, the wrist is treated with digital pressure while the patient holds the hyoid toward the side of wrist involve-

11—9. Therapy localization to wrist while in position to move only slightly for second phase of test.

11—10. Second phase, two-handed therapy localization to wrist and ankle. Subject's arms are not touching the knee, which could add another variable.



11—11. Digital massage of ankle ligaments for wrist pain, while patient holds hyoid toward side of therapy on the ankle. Wrist contact by doctor is only for monitoring pain reduction.

ment. Always hold the hyoid toward the side being manipulated.

Digital manipulation is applied with 8-10 pounds of pressure intermittently for 30-40 seconds. While the manipulation is being administered, the examiner evaluates the contralateral articulation for pain reduction. Successful and significant reduction of pain will generally be observed during this period. Holding the hand on the painful area for monitoring the pain does not seem to have any therapeutic correlation; the reduction of pain is similar, regardless of whether the non-manipulated articulation is contacted. The monitoring simply helps determine the length of time to continue manipulation.

The contralateral correlation presented is nearly always the pattern observed. In rare instances, an ipsilateral pattern may be present. The procedure is carried out in the same manner, with the hyoid held toward the side being manipulated. The reason for the unusual ipsilateral pattern is unknown; it does not appear to correlate with neurologic disorganization (switching). It may be a failure of all the nerve fibers to decussate.

Another unusual pattern which does not correlate with that routinely found is positive therapy localization in the involved and contralateral articulations when they are evaluated separately. Usual AK therapeutic efforts are ineffective in eliminating the positive therapy localization, but in this case the positive therapy localization of the two areas is eliminated when both articulations are therapy localized together. The therapeutic effort is applied in exactly the same way as the usual correction described above.

Similar correlations of articulations within the trunk respond to the ligament interlink procedure. The sacroiliac articulation equates with the sternocostal articulations. Cross therapy localization to the sacroiliac and the sternocostal articulations when there is a category I or II pelvic involvement (described in Chapter 7) may show a positive therapy localization. In this instance, the ligament interlink is treated as described above.

The xiphoid process and the coccyx relate together. Involvement here may be associated with general diaphragmatic involvement or specific problems, such as hiccups.

The spinal column ligament interlink relationship seems to follow the Lovett Brother arrangement. (This interaction of the spine is discussed on page 67.) First the painful vertebra is therapy localized. While maintaining this therapy localization, the Lovett Brother is therapy localized on the opposite side to determine if positive therapy localization develops. Therapy is applied to the least tender vertebra, while the hyoid — as usual — is held toward the side being manipulated with digital pressure.

The temporomandibular joint has been clinically associated with any joint of the body. If a painful joint is being evaluated for ligament interlink and the usual association with the contralateral extremity is not found, it is sometimes valuable to examine for TMJ association. Its association is evaluated the same as any other two joints on a ligament interlink basis.

The ligament interlink approach has been found most effective in arthritis and post-trauma. Arthritis pain in fingers, wrists, elbows, etc., can often be greatly reduced with this approach. It is not unusual to observe reduction in swelling, rubor, and heat in the articulation within minutes; Goodheart reported this on his first encounter with the young man mentioned earlier in this discussion. Impressive pain reduction is seen on post-traumatic involvement such as sprains, after the initial healing has taken place.

The ligament interlink approach is not applicable to all joint conditions. It does not substitute for proper therapy, which may include the evaluation and correction of a subluxation, reduction of strain in the joint by correcting imbalance of the supporting musculature, and other procedures described throughout applied kinesiology.

Reactive Muscles

In this discussion, we will use the term "reactive muscle" when referring to a muscle which weakens, as observed on manual muscle testing, following activity of another muscle. A reactive muscle is one whose dysfunction is detected only when tested in a particular sequence with activation of another muscle. The reactive muscle weakness is apparently due to improper signaling from the contraction of the first muscle. These two muscles can be referred to as a reactive pair, or a portion of a reactive group.[52] If the reactive muscle is not tested in this se-

quence, it will appear to be functioning normally. As a broader understanding of the reactive muscle phenomenon develops, we see that interactions within the neuronal pools are very broad and widespread and cannot be listed in a chart as all-inclusive.

The dysfunctioning muscle known as "reactive" will often be overlooked during an initial examination with applied kinesiology methods. A typical example is an individual who has had repeated injuries to his knee, or who experiences knee pain after physical activity. The AK examination evaluates for an imbalance of the knee stabilizing muscles, subluxations, and structural strain, as well as for the usual orthopedic findings of meniscus involvement, pathology, etc. Although the patient complains of recurrent knee problems, it is not unusual under these circumstances to find an apparently normally functioning knee, void of any pathology. One possibility is that a knee stabilizing muscle, such as the sartorius, fails to generate appropriately timed maximal force output under certain conditions. The sartorius may temporarily produce inadequate contraction immediately after activation of the tibialis anterior or quadriceps, among others. The muscle first contracted appears to send improper communication to the sartorius, inappropriately influencing it.

A football receiver may be running to position himself and quickly cut laterally, using considerable contraction of the quadriceps. As he turns, it is necessary for the sartorius to medially stabilize the knee. If the sartorius contracts too weakly at this moment, the possibility of knee injury greatly increases.

In the situation illustrated, both the sartorius and quadriceps will appear normal with the usual AK testing procedures. Generally, if the quadriceps is tested and the sartorius is tested immediately afterward, both should test strong. In the case of a sartorius reactive to quadriceps, there will be an immediate weakening of the sartorius if tested promptly after the quadriceps has contracted. In other words, if there is an immediate requirement for the sartorius to contract after the quadriceps has, the sartorius appears to generate maximal contraction late, thus testing weak on manual muscle testing. The first muscle to contract (quadriceps) is considered the primary muscle, and the second muscle to contract is considered reactive. Treatment is directed to the primary muscle proprioceptors, which appear to give inappropriate afferent impulses that excessively inhibit the reactive muscle.

MECHANISM

Goodheart[18] hypothesized that the neuromuscular spindle cell of the primary muscle is "set too high"; thus when there is activation of the primary muscle, the Ia afferent impulses cause an overabundant inhibition of an antagonist muscle through the inhibitory interneuron. The example of quadriceps contraction inhibiting sartorius activity demonstrates this, because the quadriceps is an extensor and the sartorius is a flexor of the knee. In early work with reactive muscles, it was thought they were always agonist-antagonist pairs; however, it was soon found that muscle reactivity could take place in wide and diverse situations. The exact mechanism and total understanding of reactive muscle neurophysiology are unknown. Several hypotheses are presented here for further consideration.

Trauma to a muscle or proprioceptor is the usually suspected etiology. In some cases, specific trauma appearing to correlate with the initiation of the dysfunction can be traced through a patient's case history. In these situations, the location of the injury may be remote from the symptoms experienced by the patient. Evaluation of the injured area and testing of the muscles involved may well find the primary muscle to which the symptomatic area is reactive. In other cases, the patient can recall no injury which seems to correlate with the onset of symptoms. It must be recognized that many seemingly harmless traumatic episodes are overlooked, but they can be of great importance.

Another possible etiology of neuromuscular spindle cell dysfunction is that the spindle cell is "trained" by chronic muscular imbalance. The imbalance can be due to habitually poor posture, or an antalgic position which is chronic. The retraining of the neuromuscular spindle cell can be due to a change in the length of the intrafusal muscle fibers, or from activity of the gamma efferent neuron. This seems especially appropriate in the possibility of a neuromuscular spindle cell adapted (retrained) to muscular imbalance. When structural balance is changed by other applied kinesiology techniques, the adapted spindle cell is no longer appropriate for the muscular length; it may create a reactive muscle, reactive muscle pairs, or reactive muscle groups through interaction in the neuronal pools.

Treatment directed to the muscle proprioceptors (described in Chapter 10) appears to influence the mechanism causing a reactive muscle weakness. The muscle spindle cell is often involved, and the Golgi tendon organ occasionally requires attention. Direct trauma to the proprioceptor, with edema and eventual adhesive scarring, could cause the mechanism to give improper stimulation to the afferent nerve supply. Mechanical manipulation could disperse the edema in case of an acute situation, while breaking up the adhesive scarring in chronic conditions.

Goodheart hypothesized that the extrafusal muscle fibers (major muscle mass) are hypertonic, causing the muscle spindle cell to be stretched just below firing level. Thus contraction of the major muscle mass stimulates the spindle to give excess volleys of impulses to the afferent fibers, causing excessive inhibition to the antagonist muscle. This could also correlate with beta axons demonstrated electrophysiologically by Bessau et al.[6] in the cat. The beta axon is efferent innervation to the intrafusal fibers of the neuromuscular spindle cell. It seems reasonable that their presence in the human (said to be rare) could cause a reverberating circuit from the spindle afferent to the alpha motoneuron, from which the beta axons are derived. This type of circuit could cause the muscle to be somewhat

hypertonic and also maintain the muscle spindle at a state just below — or slightly into — the firing level. Thus major contraction of the extrafusal muscle mass would cause excessive inhibition of antagonists.

An insight into the reactive muscle mechanism and manual muscle testing in general is seen in a study done by Triano and Davis.[52] The study was of reactivity in the deltoid, secondary to contraction of the rhomboid muscle. Using surface electrodes, the electrical activity of the deltoid — both direct and integrated — was observed by electromyography. Three tests were performed. (1) The subject lifted his arm by deltoid contraction and held it in 90° abduction for ten seconds; it was then adducted to the neutral position. (2) The subject lifted his arm to 90°. The operator applied 25 foot pounds of pressure to the arm with a calibrated lever. The subject resisted the pressure for 10 seconds, and then adducted his arm to the neutral position. (3) The rhomboid was contracted against standard manual muscle testing pressure applied by the operator for four seconds; the arm was then abducted to 90° and the 25 foot pounds of pressure applied.

In the presence of a deltoid reactive to rhomboid contraction, the subjects were unable to resist the 25 foot pound pressure for the full 10-second period; their mean level of ability was 7 seconds. Without the prior rhomboid contraction, the subjects were able to maintain contraction against the pressure for the full 10 seconds.

A most interesting aspect of this study is the change in the electromyograph when testing the deltoid under non-reactive conditions and those of reactivity. The EMG gave indication of a timing factor in recruiting muscle motor units, as well as the nature and frequency of their contraction. In the positive reactive muscle test, early electrical activity was not as clearly defined, and the peak of electrical activity was delayed.

Therapeutic digital pressure was then applied to the rhomboid's neuromuscular spindle cell for hypertonicity, as described in Chapter 10. Further testing revealed that the therapeutic effort eliminated the reactivity of the deltoid. Its function was then analagous to the control test, #2.

Triano and Davis observed no change in the electrical activity of the deltoid after applying generalized pressure into its belly. This seems to indicate that there is no correlation to Hagbarth's[27, 28] studies on muscle reflex activity from cutaneous touch and pressure. It implies that a linear force to change the muscle length is necessary to change muscle reactivity. Their study also included correlation of Sherrington's law of cross reciprocal innervation by attempting to influence the tested deltoid with digital pressure to the muscle spindle cell of the contralateral deltoid. Bi-digital pressure directed to pull both ends of the muscle spindle cell apart was successful in changing the strength of the deltoid and the EMG findings. They consequently suggest that terminology should be changed from "reactive muscle" to "reactive muscle pairs" or "reactive muscle groups."

There appears to be a very widespread influence of reactive muscles throughout the body. The pairs (or groups) can be found in almost any combination. Clinical experience is finding systematic approaches for locating reactive muscle pairs. Further evaluation of the hypothesis will probably reveal additional correlations of muscular patterns and give greater understanding of this clinically valuable tool.

EXAMINATION FOR A REACTIVE MUSCLE

The examiner should look for a reactive muscle when problems develop during physical activity. The reactive muscle appears to be a common cause of problems resulting from athletic endeavors. For example, an athlete taking a backswing in preparation for a primary movement ordinarily enhances his strength by doing so. Stretching the muscle which will soon be active in the primary swing uses the muscle spindle cell activation to an advantage, because the afferent volleys stimulate the alpha motoneuron in preparation for the primary thrust. This is the stretch reflex being put to use advantageously.

Another way that the backswing increases strength for the primary activity is by the rebound phenomenon. As the antagonist to the agonist being investigated is contracted, reciprocal inhibition is removed when the muscular contraction becomes complete; it causes a facilitation of the previously opposing muscle which now becomes the agonist. This rebound phenomenon is responsible for mechanisms such as the rhythmic stepping reflex of a single limb, as seen in a spinal animal whose cord has also been severed medially to isolate the right and left halves of the body.[26]

In the case of a reactive muscle, the backswing can begin the problem. It requires contraction of the antagonist to the prime mover of the major thrust. This may cause an immediate weakening of the prime mover, which should be at optimum function for the swing phase. For example, on a tennis serve the backswing requires contraction of the rhomboid, which can cause immediate inhibition of the anterior deltoid. This decreases the strength of shoulder flexion during the serve.

When a patient complains that a joint "just gave out," the answer may be found in a reactive muscle, especially if the supporting muscles and the joint test normal with usual evaluation procedures. Again, this type of deficiency is often seen following strenuous physical activity, such as running, skiing, etc. The joint may not actually "give out," but it may develop pain during the activity; the pain usually clears when the stress is discontinued.

First it is necessary to determine the probable pair of muscles involved in reactivity. A good rule to follow is to first evaluate muscles which are antagonists to the suspected reactive muscle. In the case of a ginglymus joint, such as the elbow or knee, the pattern is easy to evaluate. An obvious example is the quadriceps with the hamstrings. More subtle combinations, like the lateral head of the

gastrocnemius with the popliteus, must also be checked. In more complicated joints, such as the shoulder, the combinations become somewhat more difficult to visualize.

The reactive muscle may be associated with antagonist structural action, but not of the same articulation. An example is the rectus femoris with the abdominals. The abdominals flex the pelvis on the lumbar spine, and the rectus femoris flexes the hip on the pelvis. While both are flexors, they are antagonists to each other, as the abdominals support the pelvis from superior and the rectus femoris from the inferior.

There is a correlative function of muscles known as **muscle interlink** clinically observed with the reactive muscle phenomenon. This is a relation of the muscles similar to that described earlier under joint and ligament interlink. The flexors of the knee associate with the contralateral flexors of the elbow on a possible reactive muscle basis. This appears to correlate throughout the body, such as the flexors of the ankle with those of the wrist, extensors of the toes with those of the fingers, etc. Usually the correlation is on a contralateral basis; in some instances it may be ipsilateral.

The accompanying chart of reactive muscles serves as a guideline, but it is not all-inclusive. The examiner's understanding of body mechanics and his ability to be innovative in examination procedures offer the best approach in finding reactive muscles.

TESTING PROCEDURE

The reactive muscle testing procedure is applied to two muscles which are strong in the clear. First, the muscle suspected of supplying inappropriate signaling from its proprioceptive system is tested, then immediately the muscle suspected of being reactive is tested for weakening. If the muscle is reactive, it will weaken on manual muscle testing. The weakness will last long enough for observation if tested promptly after the first muscle is activated. The positive test will sometimes be eliminated when the patient therapy localizes to a muscle spindle cell or Golgi tendon organ location in the primary muscle. As with the proprioceptive technique described earlier, these locations are usually palpable as small masses that feel fibrous in nature.

When the involved spindle cell or Golgi tendon organ is found, it is treated with manual manipulation to reduce activity in the primary muscle. For the neuromuscular spindle cell, this requires that digital pressure be applied at two points toward each other over the cell location. For the Golgi tendon organ, the pressure is applied over the proprioceptor, away from the belly of the muscle. In some cases, it is considered valuable to give nutritional supplementation in the form of raw bone concentrate or nucleoprotein extract.

A muscle can also be reactive to joint dysfunction. It is not uncommon to have a muscle weaken immediately after a joint is moved. This could be from inappropriate signaling from the proprioceptors of the joint. If this is suspected, the articulation is simply challenged and manipulated in the usual manner. The hypothesis that inappropriate proprioceptive stimulation can cause inhibition of a muscle immediately after joint movement seems reasonable for this often observed clinical entity.

REACTIVE MUSCLE CHART

The left column represents the muscle suspected of being reactive; the right column is the muscle which requires muscle spindle cell or Golgi tendon organ sedation. Note that all muscles listed on the right are also listed on the left, and vice versa. The reactive muscle may be in either sequence.

No chart is all-inclusive; additional examination for muscle interlink, as previously described, may be necessary. Other combinations not as frequently observed may also be found by analysis of the patient's problem. If a particular joint is involved, the prime mover, synergists, antagonists, and fixator muscles should be evaluated. Contralateral muscles should also be evaluated; they may be involved on the basis of cross reciprocal innervation. Generally, the patient can give clues about activities which appear to make the condition worse. This is especially true in sports. All preparatory motions to the difficult activity should be evaluated for possible contribution on a reactive muscle basis.

The chart is organized by body sections, beginning at the cervical spine and proceeding to the shoulder, elbow, trunk, pelvis, hip, knee, and ankle. Note there is overlapping of muscles which influence two articulations.

Suspected Reactive Muscle	Sedation Required
Neck flexor	Contralateral psoas
Splenius capitis	Contralateral piriformis
Upper trapezius	Latissimus dorsi Biceps Contralateral upper trapezius
Deltoid	Rhomboid Pectoralis minor
Supraspinatus	Rhomboid Pectoralis minor
Rhomboid	Deltoid Serratus anticus Supraspinatus
Latissimus dorsi	Contralateral hamstring Upper trapezius
Pectoralis minor	Serratus anticus Supraspinatus Deltoid
Pectoralis major (clavicular division)	Gluteus maximus
Serratus anticus	Rhomboid Pectoralis minor
Biceps	Triceps Upper trapezius
Triceps	Biceps Supinator
Sacrospinalis	Transversus abdominis Gluteus maximus Hamstrings
Diaphragm	Psoas
Rectus Abdominis	Quadriceps Contralateral gluteus medius
Upper rectus abdominis	Lower rectus abdominis

Suspected Reactive Muscle	Sedation Required
Lower rectus abdominis	Upper rectus abdominis
Transversus abdominis	Sacrospinalis
Psoas	Adductors Contralateral anterior neck flexor Diaphragm
Gluteus medius	Contralateral rectus abdominis
Piriformis	Contralateral splenius capitis
Gluteus maximus	Sacrospinalis Pectoralis major (clavicular division)
Hamstrings	Sacrospinalis Contralateral latissimus dorsi Quadriceps Popliteus
Tensor fascia lata	Adductors Peroneus tertius
Adductors	Tensor fascia lata Psoas
Quadriceps	Gastrocnemius Hamstrings Rectus abdominis Sartorius
Sartorius	Tibialis anterior Quadriceps
Popliteus	Gastrocnemius Hamstrings Upper trapezius
Gastrocnemius	Popliteus Quadriceps
Tibialis anterior	Sartorius
Peroneus tertius	Tensor fascia lata

Muscle Stretch Reaction

Moderately stretching a muscle prior to manual muscle testing usually causes one of two reactions. The expected effect is for the muscle to test stronger. In an abnormal situation, a muscle can test weak immediately after being stretched. This is called an "abnormal stretch reaction" in applied kinesiology. First let's discuss the normal physiology of a moderately stretched muscle.

The muscle stretch, or myotatic, reflex[24] occurs as a result of reaction in the neuromuscular spindle cell when a muscle is stretched. Slow stretch causes impulses to be sent from the neuromuscular spindle cell primary afferent (Ia) fibers for monosynaptic connection to the alpha motoneurons of the same muscle, causing contraction. This is used as a feedback system in postural balance. Other examples of muscle facilitation from stretching are deep tendon reflexes, such as the knee jerk, which illustrates phasic response. A similar feedback mechanism is used to adjust to varying loads. For example, if an outstretched arm is carrying a load and an additional burden is placed upon it, the neuromuscular spindle cell is stretched and the primary afferents are stimulated. They, in turn, stimulate the alpha motoneuron for muscle contraction to maintain the original position with the additional load.

Another muscle characteristic which changes its strength but is not related to the muscle stretch reaction is called the stretch response. This varies from the stretch reflex in that it does not seem to be a neurologic pattern; it is considered to be a change in muscle strength relating to the mechanical positioning of a muscle prior to its contraction. In general, a stretched muscle contracts more forcefully than when it is unstretched at the time of activation. The optimum length of contraction varies with different muscle fiber arrangements. The reason for the varying strength is the filament relationships in a sarcomere, explained by the sliding filament theory.[26] This does not relate to the muscle stretch response, because the muscle

is the same length each time it is tested. The only variance is that the second test is administered after applying a moderate stretch.

There are several indications that evaluation for abnormal stretch reaction should be made. On a structural basis, the muscle will typically appear to be shortened, or an articulation associated with the muscle will have a limited range of motion. Sometimes this muscle involvement is present with pain patterns, especially those associated with trigger points (described in the "Spray and Stretch" section later in this chapter). The muscle stretch test helps identify the involved muscles.

Abnormal stretch reaction may reveal a muscle-organ/gland association not apparent on initial evaluation. Sometimes the organ or gland is obviously involved, but the muscle(s) associated does not show a problem. With the introduction of this test, the association may be revealed.

Care must be taken when applying stretch to the muscle that it is not too vigorous. A normal muscle reaction to vigorous stretch is temporary inhibition. The stretch used in applied kinesiology is just past the range of motion which extends the muscle to its maximum amount.

Examination

The general testing procedure is quite simple. Test the muscle by the usual method to determine its strength. If the test appears normal, stretch the muscle to its full range of motion and apply slight additional stretch at the end. Immediately re-test it. In the presence of a positive stretch reaction, the muscle which previously tested strong will now dramatically weaken.

It is possible for a muscle to have abnormal stretch reaction, yet test weak in the clear. If the muscle initially tests weak and the examiner wishes to test for abnormal stretch reaction, he must first strengthen the muscle using one or more of the five IVF factors. When the muscle is strong, testing for stretch reaction can be initiated.

Care must be taken to insure that the positive reaction obtained is actually from stretching the muscle. Sometimes moving a limb through its range of motion to stretch the muscle challenges a subluxation of an articulation, or the muscle is involved with ligament stretch reaction, described later. Differential diagnosis is necessary to insure that the testing procedure is actually evaluating what the physician thinks it is.

Fast and Slow Fibers

Another factor must be considered when stretching a muscle for the test. Muscles are made up of fast and slow muscle fibers.[26] Some muscles, such as those of the eye, are composed almost entirely of fast muscle fibers and have an extremely rapid contraction time — less than 1/100th second. The gastrocnemius and soleus can be compared for their different functions and types of muscle fibers. The gastrocnemius has a contraction time of about 1/30 second, while the soleus contracts in 1/10 second. The gastrocnemius is used for running and jumping; the soleus muscle — slow in contracting — aids in maintaining postural balance.

The turkey is a prime example of slow and fast muscles. The postural muscles of the legs and thighs make up the turkey's dark meat, while the phasic or fast muscles used for flying are white. In man there is not as significant a separation. There is, however, a heavier concentration of one type of fiber, depending upon the muscle's primary purpose. To be able to apply the stretch correctly for testing purposes, it is important to have some idea of the dominant fiber in a muscle. This can usually be determined by evaluating the muscle's general function. If the muscle is primarily for weight bearing and maintaining postural balance, it will be dominated by slow fibers. Non-weight bearing muscles — such as those in the shoulder — are dominated by fast phasic fibers.

When testing a muscle for stretch reaction, do it with the speed appropriate for the type of muscle being tested. If a muscle dominated by slow fibers is stretched rapidly, it may not show a positive stretch reaction; it may if stretched slowly. Conversely, a muscle dominated by fast fibers usually will not show a positive reaction when stretched slowly. For example, when testing the sternocleidomastoid — a phasic muscle — the stretch must be rapid and the muscle tested immediately thereafter. To test the right sternocleidomastoid muscle, have the patient quickly turn his head to the right, which stretches the muscle, and then turn it to the left for the testing position. If the head is turned slowly to the right to stretch the sternocleidomastoid and then turned into the testing position, there will probably not be a positive reaction, even though the muscle stretch response is present. To test the adductor muscles in which slow fibers are predominant, slowly stretch the muscles by abducting the limb to the maximum range of motion; then attempt slight additional motion for the stretch. Test the muscles immediately after stretching. If there is a question as to the dominancy of slow or fast fibers in a muscle, test both ways.

There are two methods for correcting this reaction which have been associated by Goodheart.[20] These are the fascial release and the spray and stretch techniques. The muscle stretch response gives added clinical diagnostic information for both techniques. Each has its own original diagnostic system for determining need. Although both approaches seem to correct the muscle stretch reaction, each seems to work better with a specific pattern of dysfunction which generally indicates the proper technique to use.

FASCIAL RELEASE

One of the methods for correcting abnormal stretch reaction is the fascial release, sometimes called fascial flush. This is a treatment similar to the rolfing[41] and Nimmo technique[39] approaches to the myofascia.

Rolf describes fascia as fibrous connective tissue, forming a network of support which connects and communicates throughout the body. It surrounds each visceral organ and muscle with elastic membranous sheaths and

allows muscles to glide smoothly over one another. Following trauma to a muscle, the investing fascia appears to form scar tissue as it heals. Just as scar tissue forms on the skin following trauma, fascia tends to become denser and shorter as it heals. Thus, following an infectious illness or traumatic injury, layers may sometimes adhere to one another. Furthermore, the friction and tension produced may cause congestion and blockage of blood and lymphatic flow, as well as pain and limitation in range of motion.

The muscle and its surrounding fascia should be the same length. When the muscle contracts, the fascia should be able to move smoothly with the muscle. Likewise, when the muscle relaxes, the fascia should also. As long as the muscles and fascia operate as a unit, the body interprets their activity as integrated and consistent. It is suspected that lack of harmony in the myofascial complex improperly stimulates the proprioceptors in the fascia, apparently causing inhibition of the muscle immediately after challenging the myofascial complex by stretching the muscle.

Goodheart[20] likened muscles to pumps for the lymphatic and circulatory systems. Support for this hypothesis can be seen on a clinical basis. Therapy localization indicates that the neurolymphatic reflex associated with the organ and muscle is consistently involved when a positive stretch reaction is due to apparent myofascial complex disharmony. Dysfunction of the organ or gland is often associated with the muscle which has myofascial disharmony. Therapeutic efforts toward the muscle frequently yield clinical results in the associated organ or gland. An example of this which can be quantified is fascial release treatment to the teres minor, which is associated in applied kinesiology with the thyroid. When the teres minor is so involved, axillary temperature can be measured with a thermister from a biofeedback unit and evaluated as treatment is administered.

Barnes[3] established axillary temperature as a viable approach to diagnosing hypothyroidism. Axillary temperature was found more reliable than oral in Barnes' study of 1,000 soldiers, because there is no direct interference from oral infection. When therapy is administered to the myofascial complex, it is common to observe 1°-2° F. increase in axillary temperature within minutes. Of course, other factors can cause a lowered axillary temperature. (This and other factors of hypothyroidism are discussed in Volume V.)

Evaluation

There does not appear to be a specific method to determine when fascial release is the treatment of choice to correct the muscle stretch reaction. Generally, fascial release is used when organ dysfunction seems to be associated, and spray and stretch (described next) is used when pain is associated. There is no specific therapy localization present when fascial release is needed. There is shortening of the muscle when either fascial release or spray and stretch treatment is needed.

Correction

The treatment for a myofascial dysfunction in conjunction with a positive stretch reaction is deep massage of the structure, which apparently breaks down adhesions and aids in regaining normal function. The sol-gell hypothesis suggested by Rolf[42] may be a factor. It is best to apply a lubricating lotion to the skin prior to the deep kneading-massaging pressure. The massage is done linearly with the muscle fibers; a specific direction of the linearity is not necessary, as it is in muscle spindle cell technique. The only directional consideration is that of usual massage therapy. Pressure should always be applied toward the heart when over a structure that may contain veins. This is so that blood will not be trapped in the vein and forced against the valves, thus causing them to rupture. The same consideration is given for the lymph vessels.

Additional Treatment

The neurolymphatic and neurovascular reflexes for the muscle should be treated if recidivism occurs.

Vitamin B_{12}, in combination with stomach and liver concentrate or nucleoprotein extract, has been found to help recidivism on a clinical basis. It is routinely recommended three times a day for at least two or three weeks. Interestingly, a low dosage of B_{12} — five micrograms — appears to work better than higher doses of B_{12} alone. Vitamin B_{12} without the stomach and liver factors does not appear to have any value on a clinical basis.

SPRAY AND STRETCH
("Trigger Points")

Various forms of therapy have been used to control "trigger points." The system most widely administered is Travell's,[51] which locates myofascial trigger areas associated with referred pain. Treatment is provided by applying a coolant spray while passively stretching a muscle associated with the complex. This approach has been successfully used on a clinical basis by many practitioners in various professions. It appears that manual muscle testing can add to the diagnostic aspect of this technique. The muscle or muscles involved with the syndrome show a positive response to the muscle stretch reaction test. Successful treatment done as described by Travell removes the positive muscle stretch reaction.

Description

Travell described a trigger area as ". . . a small, hypersensitive region from which impulses bombard the central nervous system and give rise to **referred** pain." The pain may not be located in the dermatome of the muscle; however, there is a consistent pattern appearing in these conditions which led Travell to develop charts indicating the location of the trigger point, muscle involved, and referred pain pattern. Because of the pattern's consistency, it appears there are fixed anatomic pathways involved.

The pattern of pain is known as the reference zone, and the trigger point may be located there. Usually it is remote from, or on the edge of, the painful area. The pain

in the reference zone has one or more areas where it is usually severe and localized, or the trigger point itself may be the location of the patient's complaint. Radiating around this is a much larger area with varying degrees of pain. Trigger points may be active or latent. An active point is one sufficiently irritable to cause clinical pain. Digital pressure applied to an active trigger point will produce the pain pattern if none is currently present, or it will intensify present pain. Latent trigger points are locally tender, but they will not activate a referred pain. The trigger point will have a hypertonic muscle associated with it.

The hypertonic muscle limits the range of motion of its associated articulation(s). The muscle will usually test strong in the clear, but will weaken if tested immediately after stretching, giving a positive muscle stretch reaction. Structural imbalance resulting from the hypertonic muscle may be a significant factor of the patient's symptoms. It may cause a joint imbalance because of its shortening, or there may be poor support to a structure after the muscle has been stretched.

There may be several trigger points associated with a particular condition. If more than one area is involved, one is usually major; others are satellite involvements requiring a search-and-find approach to completely clear the clinical picture.

Although cryotherapy is used in the spray and stretch technique, it must be recognized that the coolant spray — correctly applied — does not directly affect the muscle. In fact, the application of excessive coolant may cause the already hypertonic muscle to become more so, thus aggravating the condition. Mennell[36, 37] offers a hypothesis of the mechanism involved. A hypertonic, shortened muscle excessively stimulates afferent nerve fibers, possibly from the neuromuscular spindle cell, Golgi tendon organ, or joint receptors. The noxious impulses appear to reflex at the spinal cord level, or they are processed at higher centers to reflex back to the reference zone of pain. Goodheart's muscle stretch reaction also indicates an afferent connection to the alpha motor neuron with efferent response. If this is true, the pattern becomes a vicious cycle in which the motor stimulation maintains the hypertonicity of the muscle, causing continued afferent stimulation. Mennell further describes spinal tracts in higher centers that may be involved, and how stimulation to the skin receptors can interrupt the cycle.

Clinically it appears that impulses arising from the thermal receptors compete somewhere in the cycle with the impulses to break the pattern. It is clinically important to passively stretch the involved muscle while the thermal receptors are being stimulated. Understanding the role of the muscle stretch in the pattern is problematic. It could be stimulation of the Golgi tendon organ, which through an inhibitory interneuron causes inhibition to the alpha motor neuron of the muscle involved. This seems unlikely, because the stretching applied to the muscle is gentle, and it also influences the neuromuscular spindle cell. The constant gentle stretching causes stimulation of the neuromuscular spindle cell and facilitates activity in the same muscle. The pathways and receptors involved may be mechanisms which have not yet been identified and investigated.

Whatever the mechanism, the patterns are consistent and respond predictably to therapeutic application. Increased range of motion in the hypertonic muscle is consistent, as well as the removal of the positive stretch reaction observed on manual muscle testing.

The trigger point may reflex into other areas to cause symptoms. Travell[48, 49] specifically refers to trigger points in the pectoralis major creating breast pain and soreness, and associates trigger points in the temporalis, pterygoid, upper trapezius, sternocleidomastoid, and other muscles as being a cause of headache, dizziness, and other symptoms. Cohen,[11] in a study of the neck proprioceptive mechanisms, established their important role in body balance as a specific physiological mechanism, giving support to mechanical dysfunction of the cervical region causing vertigo and disorientation.

The involvement may reflex into the autonomic nervous system, causing vasoconstriction and other autonomic effects limited to the reference zone of pain. The cycle may also include organs or glands on a viscerosomatic or somatovisceral basis. The pain, of course, could also be strictly visceral referred pain or somatic referred pain.

Etiology

Trauma is a common cause of a trigger point. The trauma appears to be to the muscle involved with the complex by direct injury, excessive stretching, or contraction. Once a trigger point develops, repeated muscular stress of lesser degree can activate pain in the reference zone. This is especially true when the muscle becomes fatigued, and gets worse if the muscle is chilled.

Structural strain is probably the most common cause of trigger points. This is especially true if structural strain is superimposed on a traumatized area. The hypertonic muscle containing the trigger point may be secondary to a weak muscle. This refers to the spontaneous contraction of a muscle unopposed by its antagonist. Any abnormally functioning structural component can be the primary reason for hypertonicity and the development of trigger points. It is common to find trigger points in the sacrospinalis, sternocleidomastoid, and upper trapezius as a result of pelvic dysfunction.

In addition to trauma and chronic muscle strain, Travell lists the chilling of a fatigued muscle, acute myositis, arthritis, nerve root injury, viscera ischemia, and hysteria as initiating factors of myofascial trigger mechanisms. She goes on to list general fatigue, low metabolic rate with creatinuria, estrogen deficiency, hyperuricemia, chronic infection, mild anemia, low calcium or potassium reserves, low "normal" (not optimal) vitamin C levels in the blood and adrenal cortex, vitamin B deficiency with impaired vibratory perception, and psychogenic stress as predisposing factors.[50]

Diagnosis

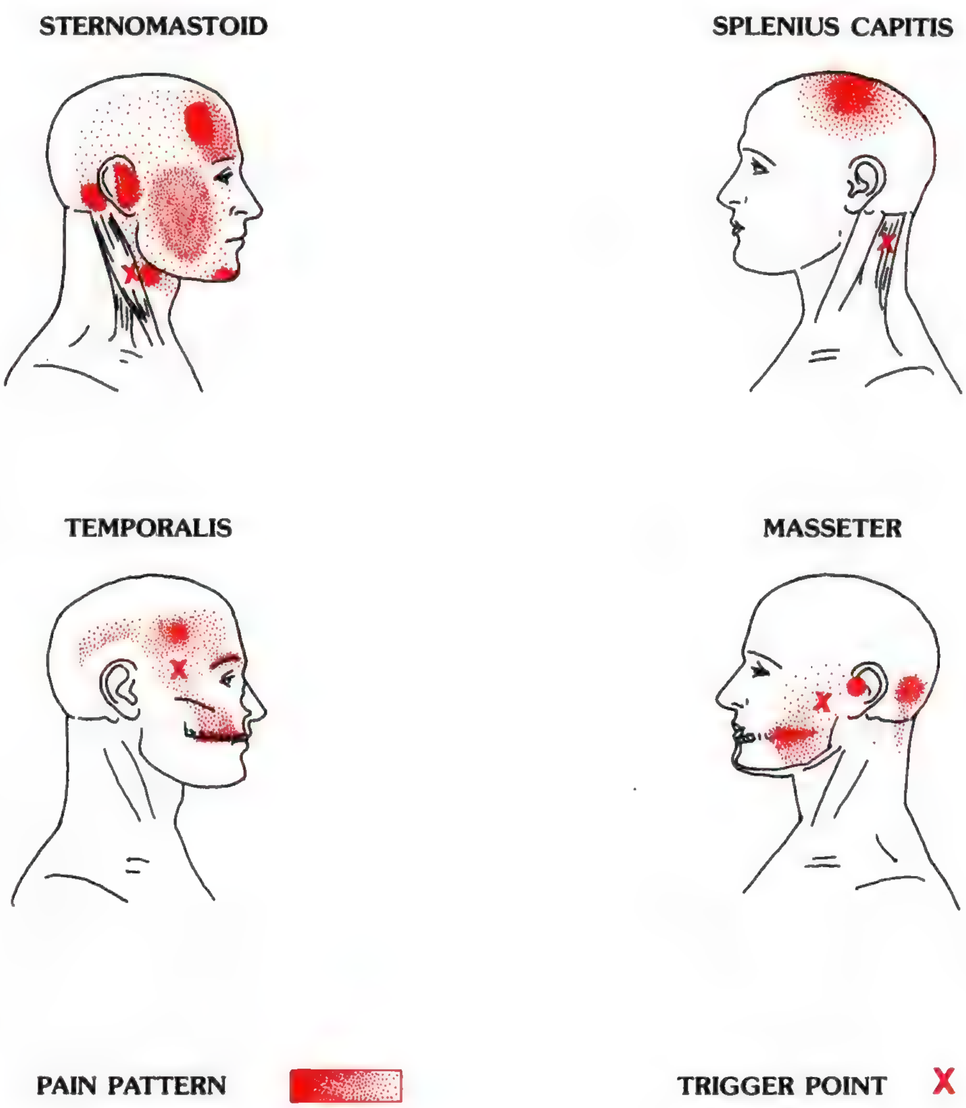
The primary method used to diagnose trigger points and their relationship to referred pain has been Travell's charts. The charts, developed clinically as a result of the treatment of over 1,000 patients, continue to gain support regarding their accuracy. They are supported by clinical accuracy and by manual muscle testing for abnormal stretch reaction. There is not a consistently positive thera-

py localization over trigger points.

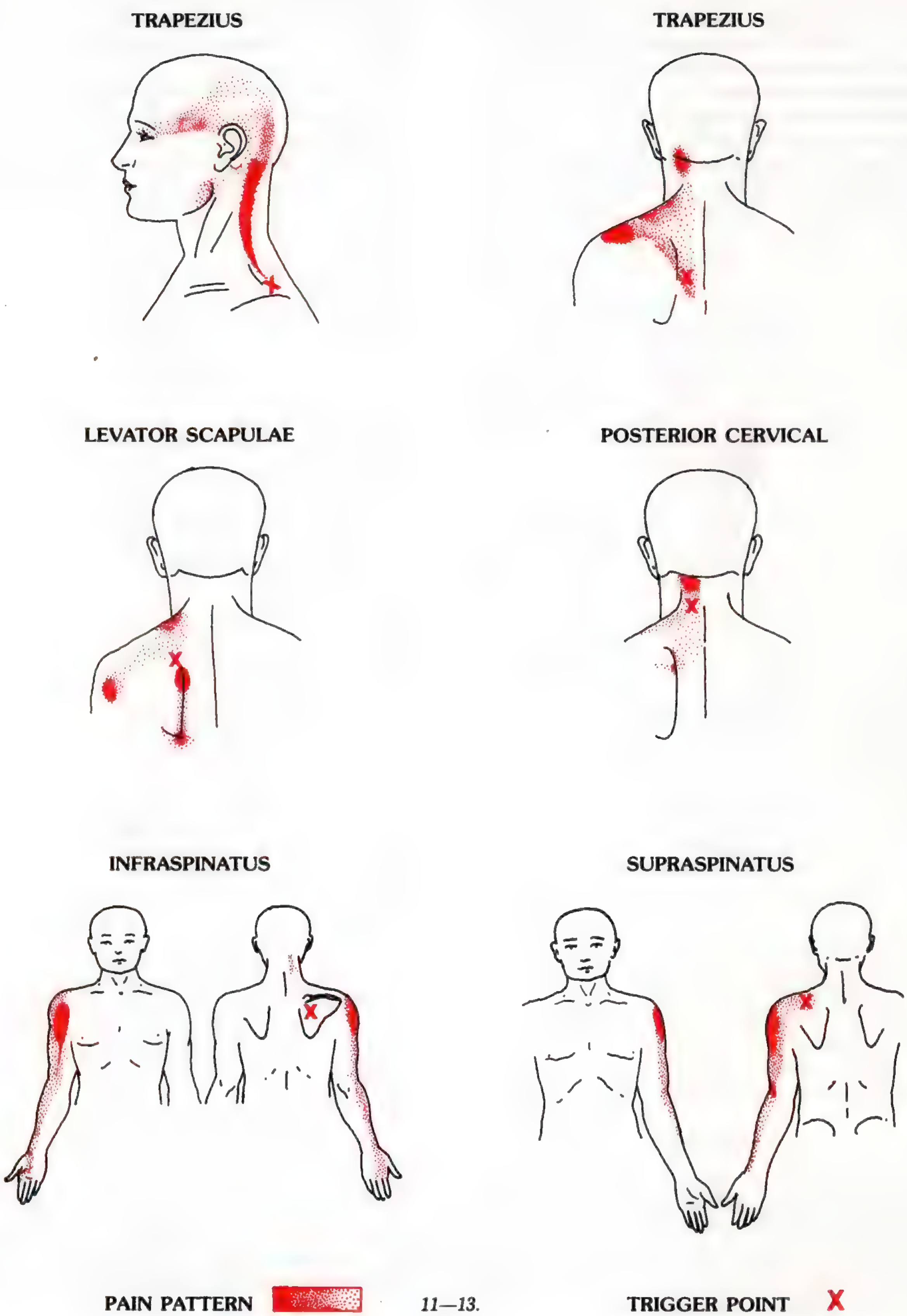
The trigger point is located in the muscle or its tendon; usually it is **not** in the area of the patient's major complaint. This bears re-stating: the point where pain originates is usually not where the patient feels the pain. The trigger point can generally be palpated as a fibrous area, varying in size from very small to larger — usually narrow — bands. Digital pressure over the trigger point area will generally elicit pain in the reference zone.

This positive indication does not necessarily mean that the trigger point is primary. It is possible for it to be secondary to organ or gland dysfunction. It appears that the viscera can send noxious impulses into the trigger point area and be its primary source. The possible visceral component should always be a consideration in the evaluation. If pain and muscle response patterns are removed by the spray and stretch technique and then return, a visceral component may be present.

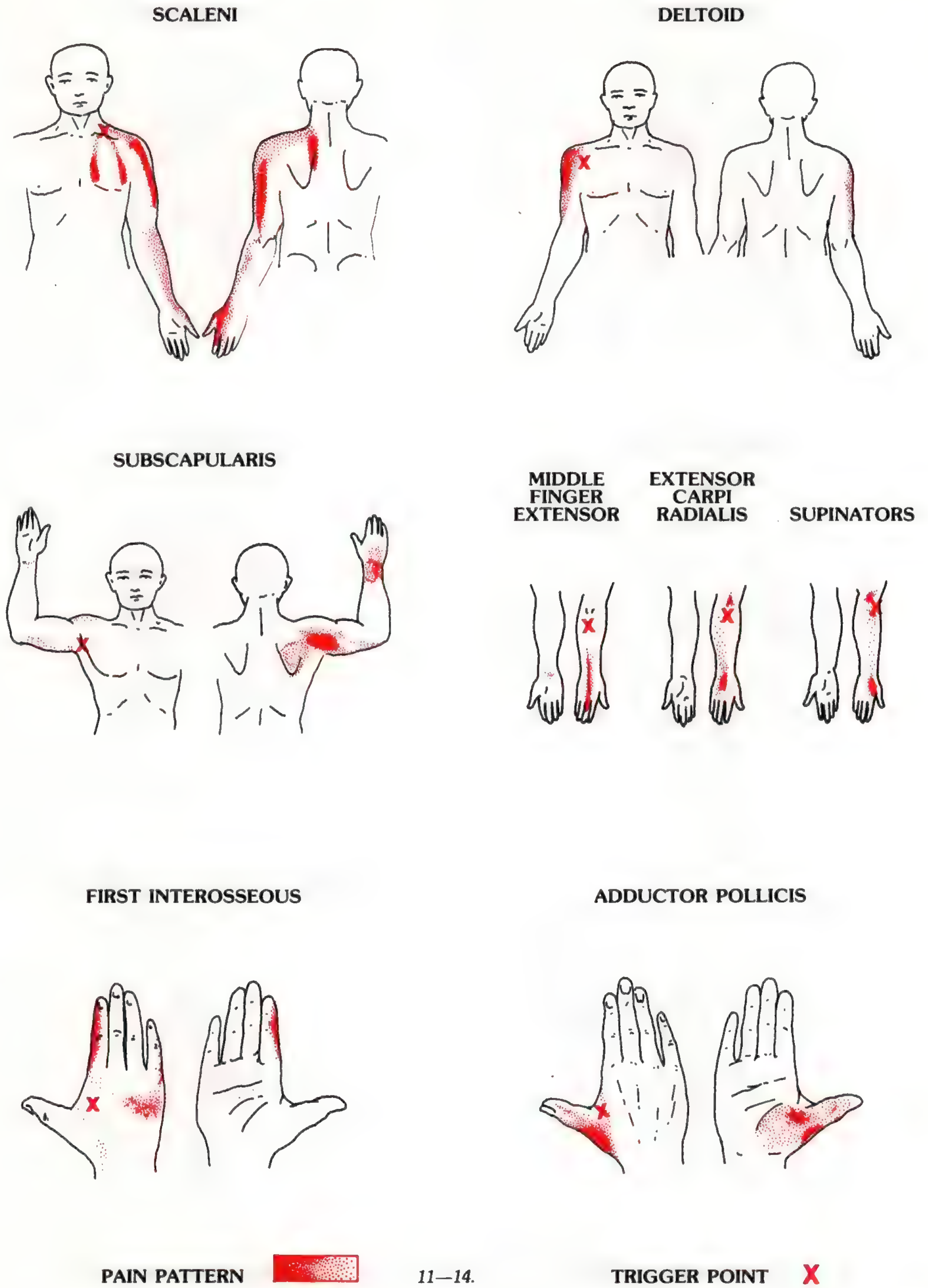
There are four methods for evaluating the muscle which appears to be associated with the reference zone of pain. These are palpation and digital pressure on the trigger point (which has already been discussed), the "jump sign," range of motion, and the muscle stretch reaction.



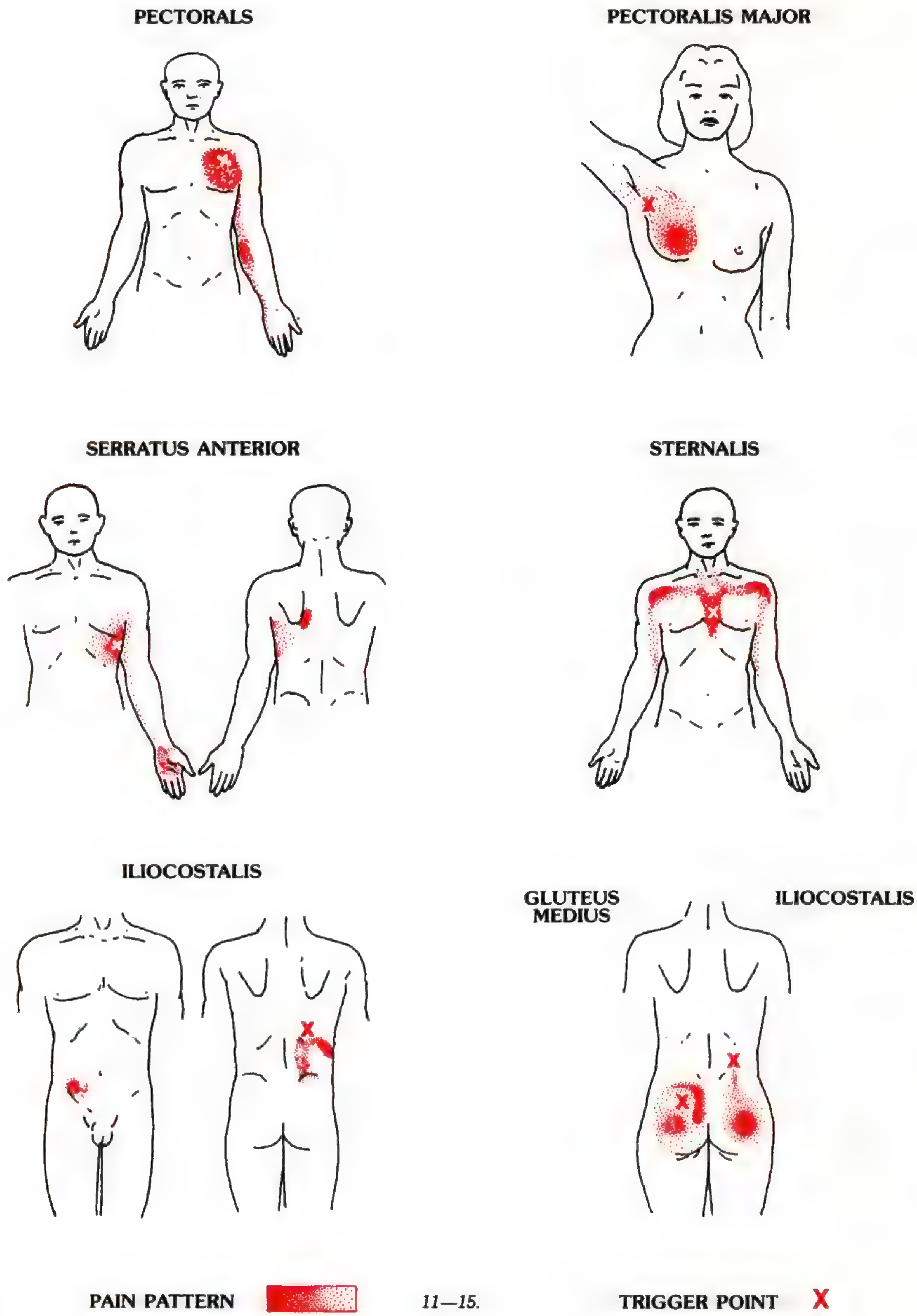
11—12 through 11—17 (above and on following pages). Predictable patterns of referred pain from trigger points, with captions indicating muscles in which offending trigger points are situated. The location of each trigger point is designated by "X." The red shaded areas are the constant areas, the heavily stippled areas a commonly observed area, and the lightly stippled areas are associated areas of pain referred from the trigger points. By palpation of the trigger point the referred pain pattern may be reproduced. By observing the pattern of pain the location of the trigger point may be predicted. (From Travell and Rinzler,[51] with permission of Dr. Travell and Postgraduate Medicine.*)*.


TRAPEZIUS
TRAPEZIUS
LEVATOR SCAPULAE
POSTERIOR CERVICAL
INFRASPINATUS
SUPRASPINATUS
PAIN PATTERN
TRIGGER POINT X

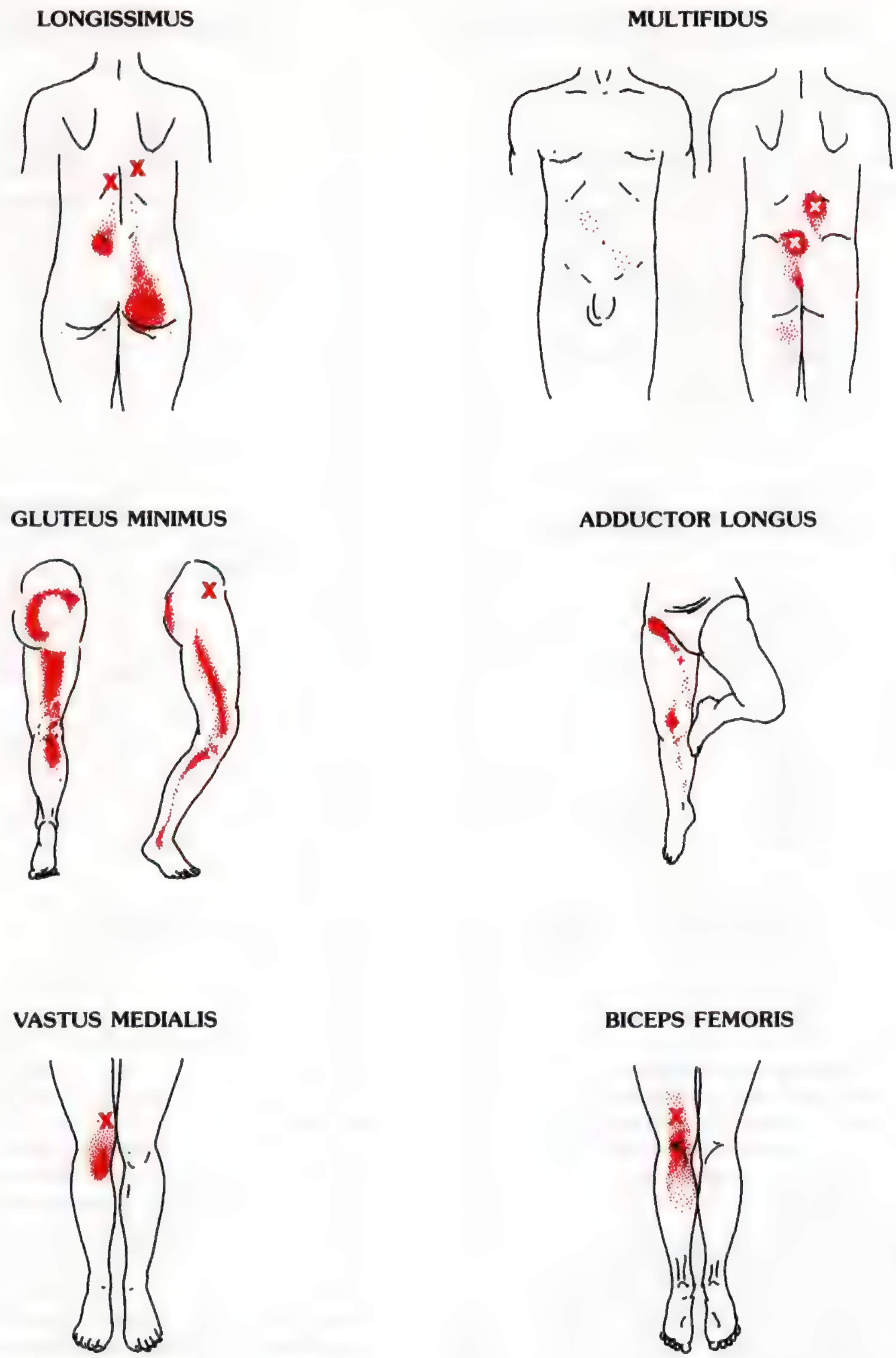
11—13.


SCALENI
DELTOID
SUBSCAPULARIS
MIDDLE FINGER EXTENSOR
EXTENSOR CARPI RADIALIS
SUPINATORS
FIRST INTEROSSEOUS
ADDUCTOR POLLICIS
X
PAIN PATTERN
TRIGGER POINT
X

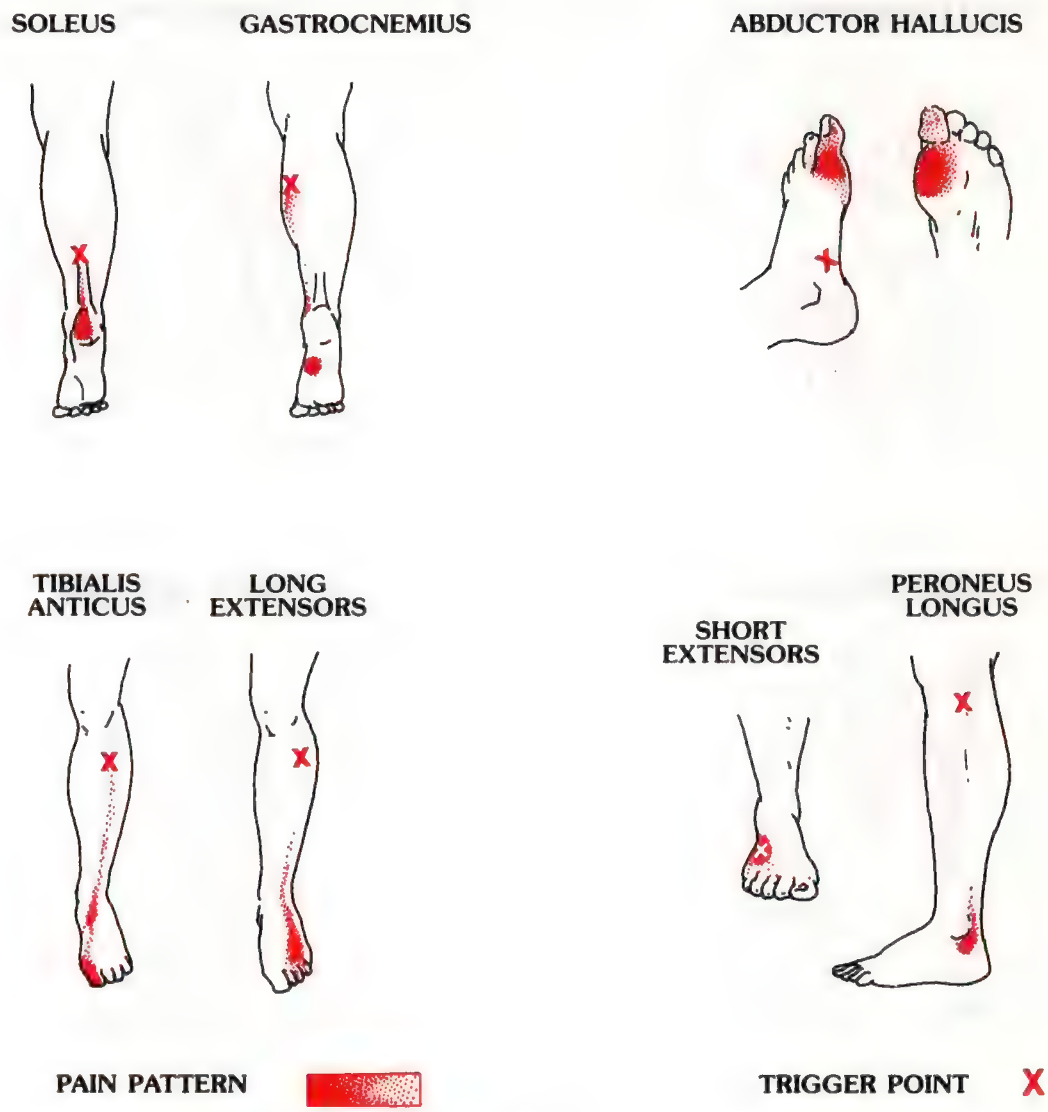
11—14.


PECTORALS
PECTORALIS MAJOR
SERRATUS ANTERIOR
STERNALIS
ILIOCOSTALIS
GLUTEUS MEDIUS
ILIOCOSTALIS
PAIN PATTERN
TRIGGER POINT X

11—15.



PAIN PATTERN *11—16.* TRIGGER POINT X



11—17.

The "jump sign" was described by Simons.[46] The muscle being evaluated is placed under moderate tension, and the examiner briskly pulls his finger across the firm band of muscle. A positive jump sign is contraction of the band of muscle. This response is consistently found in muscles which contain trigger points, not in normal muscles.

Simons[46] electromyographically demonstrated motor unit action potentials from the palpable bands of muscle associated with a trigger point. The motor unit action potential resulted from a snapping-type palpation such as used to elicit the jump sign. Their increased motor unit response, with increasingly vigorous palpation and simultaneous activation of adjacent palpable bands, suggested to him a hyperirritable spinal reflex phenomenon. He points out that ". . . although muscle spindles immediately come to mind for the afferent limb, the close association with pain calls for consideration of other muscle afference. A localized myotonic response may contribute to the contraction."

The muscle containing the trigger point will not lengthen to its full capacity. This can be evaluated by testing the range of motion of an associated articulation in the direction which elongates the muscle. Successful treatment of the trigger point will generally greatly improve the range of motion.

When the trigger point is located in a muscle or its tendon, there will be a positive stretch reaction, as discussed earlier. The muscle stretch reaction is a weakening of the muscle immediately after it has been gently stretched; prior to stretching, the muscle tested strong.

All trigger points are not located in muscle; they can be in the ligaments or fascia. If the muscle stretch reaction is not present but other diagnostic indications of a trigger

point are, further evaluation is necessary. Generally, the trigger point which is extrinsic from a muscle or its tendon is located in the connective tissue of an articulation. That articulation should be evaluated by challenge and therapy localization to determine if manipulation is necessary.

Correction

Many approaches — both invasive (injections) and non-invasive — have been used for the treatment of trigger points. Among the non-invasive are digital pressure, sine wave and galvanic stimulation, ultrasound, vibration, and cryotherapy. Travell's spray and stretch technique, a form of cryotherapy, will be described here, as it is non-painful to the patient and effective in eliminating the cycle. The two types of coolant spray which have been used are ethylchloride and fluoromethine. Ethylchloride was used prior to the development of fluoromethine, but it is not recommended because it is highly flammable, excessively cold, and toxic. Inhalation should be avoided. Fluoromethine, on the other hand, has the appropriate temperature, and is non-flammable and non-toxic.

The coolant should be applied in a direct stream rather than a spray. Fluori-Methane®** is supplied in a pressurized bottle, with a nozzle appropriate for spray and stretch technique. The stream should not strike the skin at a right angle; it should be at an acute angle, with the bottle held approximately 18" away. The area is covered in one direction only, with the stream traveling approximately 4" per second. Repeated applications are ¼" to ½" apart. covering each area only once.

The method of application is critical. Overcooling, such as frosting the skin, causes the muscle to become hypertonic, and clinically it is not efficient in producing results. If it is necessary to repeat the application, the skin area must be allowed to warm. Adequate stimulus for thermal receptors is a change in temperature, not the absolute temperature.[9]

There are two techniques in covering the area, depending upon the location of the trigger point and reference zone of pain. In some cases, the only involvement is within the muscle containing the trigger point. In this instance, the muscle is covered from origin to insertion while a gentle stretch is placed upon the muscle. As the process continues, a slow increase in muscle lengthening will generally be observed.

Generally the spray and stretch technique is used in applied kinesiology when there is a trigger point and reference zone of pain. In this case, begin at the trigger area or muscle origin and continue the application into the reference zone. Repeat applications ¼" to ½" apart until the entire trigger point muscle and reference zone are covered. During the application, the muscle is gently stretched. Like the muscle-only involvement, there will generally be an increase in the muscle length. Care must be taken with either approach not to overstretch and strain the muscle. Also, it must not be overcooled, causing increased hypertonicity.

Ice can be used as the source of cooling for trigger point therapy.[37] When ice is used, it should be the bare ice on the skin. Its melting on the skin is a safety factor against overchilling. A small point, such as the edge of an ice cube, is the most effective. Although ice may be used as an emergency source of cooling, it seems that the Fluori-Methane® spray is most effective.

The five factors of the IVF should be evaluated for the muscle(s) involved. Neurolymphatic and neurovascular reflexes especially often require treatment when trigger points are involved.

The patient's entire condition must be considered. There are frequently satellite trigger points which must be found and treated. Antagonist muscles which are weak and may be the primary cause of the trigger point must be located and treated with the five factors of the IVF. Likewise, structural strain from subluxations must be located and corrected. Webber[54] discusses the value of correcting osteopathic lesions which are part of the total complex. He states that Travell considers the priority of correcting bony subluxations to be after the trigger point complex has been neutralized. Findings in applied kinesiology are in agreement with this. Many times the muscular imbalance is contributory to the subluxation. Correcting the imbalance aids in obtaining effective correction of the subluxation. In some cases, after muscle balance is restored the subluxation is corrected spontaneously by the body. The basic rule — always challenge and therapy localize prior to making manipulative correction — applies as usual.

There are four basic considerations with recidivism. These are (1) visceral component to the complex, (2) uncorrected structural strain from subluxations, other muscle imbalance, etc., (3) postural patterns, and (4) satellite trigger points undetected and, therefore, not corrected.

The first consideration should be the possibility of a visceral component, such as cardiac, gall bladder, hiatal hernia, and other conditions which have characteristic referred pain in standard physical diagnosis. If this is the reason for return of the complex, or failure to correct it, obviously the wrong problem is being treated.

Structural imbalance may be remote and literally any place in the body. Trigger point areas in the shoulder are frequently caused by pelvic or foot subluxations. Common associated structural imbalance and trigger points in various areas of the body are covered in Volume IV, with orthopedic consideration of the various areas.

The doctor's investigation of the patient's posture should go beyond simply viewing the individual's movements. Many times the posture creating a trigger point complex is one the patient assumes during specific occupational activities or personal habit patterns. Reading in bed while propped up on one arm is a structural strain which creates many trigger point complexes in the thorax, shoulder girdle, neck, and upper extremities. (There is a discussion of postural use later in this chapter.)

Consideration should be given to the possibility of satellite trigger point complexes. Many times the patient will complain about a specific area, and a trigger point associated with it is found. There may be other trigger

**Fluori-Methane® can be obtained from the Gebauer Chemical Co., 9410 St. Catherine Ave., Cleveland, OH 44104, telephone 1 (800) 321-9348 or 1 (216) 271-5252.

points contributing to the total pattern, but because they are latent, they are not producing symptoms and thus are missed. A thorough review of the patient's total condition is important, especially when there is recidivism of an area which has been successfully treated and visceral components have been ruled out.

Contraindications

The possibility of a visceral component should always be considered when there is any type of referred pain. This is especially important when using a therapeutic approach such as the spray and stretch technique. The coolant spray appears to be capable of blocking neurologic circuits by substituting new impulses. This can potentially block pain originating in the viscera and being manifested in the soma. The potential of allowing a cardiac problem to grow worse while controlling pain by this method immediately comes to mind. Naturally, precautions should be taken by the physician so that this is not allowed to happen. On the other hand, this is a two-way street. A physician can make people "emotional cardiac cripples" by erroneously diagnosing somatic pain as cardiac referred pain. The increase in pain by physicial activity can reinforce in the patient's mind the potential of having an acute myocardial infarction when, in reality, there is no cardiac problem; rather it is one confined to structure, with its origination a myofascial trigger point. Accurate differential diagnosis is the key in either case.

The relief of pain from the spray and stretch technique does not specifically indicate its cause. Teaching patients to do home therapy with the spray and stretch technique is discouraged, because it provides the patient with a method of controlling pain rather than finding the basic underlying cause of the problem. If therapy must be administered often enough to consider home therapy, there is probably some other cause of the problem which should be found and eradicated.

Ligament Stretch Reaction

Under certain conditions, a muscle will temporarily test weak immediately after the ligaments of an associated articulation have been stretched. If the muscle test is not preceded by the ligament stretch, the muscle will test strong. This reaction is clinically important because often when ligaments are stretched, muscles supporting the articulation must be available for continuous action to protect the joint from injury. After observing this phenomenon in a clinical practice, Deutsch[12] associated it with Goodheart's[18] findings of apparent ligament stress in the sacroiliac and upper cervical areas.

Goodheart's hypothesis was that the ligament stress was in conjunction with adrenal stress as described by Selye.[44] This was because the sacroiliac and upper cervical areas showed no positive therapy localization unless the sartorius or gracilis muscle was tested. These muscles are associated with the adrenal, leading Goodheart to postulate that somehow the ligamentous structures of the pelvis and cervical spine in these patients were being adversely affected by a biochemical imbalance from adrenal dysfunction. This seemed to be supported on a clinical basis, because consistently these patients were businessmen or others who were driving their adrenals hard in the course of daily activities. The hypothesis was further supported by the clinical response obtained by nutritionally and reflexly supporting the adrenal glands. This support relieved pain and removed positive therapy localization to the sacroiliac articulation when tested on the adrenal-associated muscles.

Deutsch's expansion on these findings consisted of the observation that under certain conditions, any muscle of the body would weaken temporarily after ligaments were stretched, especially muscles directly associated with the articulation. The positive ligament stretch reaction is consistently present when the patient has relative hypoadrenia. Relative hypoadrenia must be distinguished from Addison's disease. Here we are dealing with a functional disorder, where the adrenal is unable to meet all the demands placed upon it. Relative hypoadrenia is discussed in the literature[16] and in Volume V.

The usual finding is that any patient demonstrating Goodheart's sacroiliac-upper cervical association with the adrenal will also demonstrate ligament stretch reaction throughout his body. The reverse does not seem to be true. Any ligament stretch reaction throughout the body does not necessarily have the sacroiliac-upper cervical relation with the adrenals. (Goodheart's "emotional backache" is discussed further in Volume IV.)

Schmitt,[43] using applied kinesiology, designed a clinical study (N=16) to determine the reproducibility and apparent association of the ligament stretch reaction to the adrenal gland. The study consisted of stretching the ligaments of various articulations in the body, and then retesting muscles associated with the articulation and general indicator muscles. The ligament stretch reaction was identified in three separate areas of the body to determine that the reaction was present generally rather than in any one area. After this was accomplished, various factors associated with the adrenal in applied kinesiology were evaluated by therapy localization. The reflexes examined were the neurolymphatic, neurovascular, meridian alarm point, and cranial stress receptors. A point — such as the neurolymphatic — was therapy localized, and the ligament stretch procedure was repeated, followed by muscle tests. If therapy localization to the adrenal reflex point abolished the ligament stretch reaction, it seemed there was probable adrenal involvement associated with the mechanical stretch to the ligament. After all reflexes were tested, the individual was asked to chew adrenal concentrate; its effect was evaluated by re-testing for ligament stretch

reaction. Following are the results of the nutritional administration and various reflexes tested in the study of sixteen individuals:

Reflex Point TL	Eliminated Reaction
Neurolymphatic reflex	16
Neurovascular reflex	6
Meridian alarm point (circulation sex)	8
Cranial stress receptor	8
Adrenal concentrate	10

If therapy localization to the adrenal point listed abolished the positive ligament stretch reaction, it was listed as positive. Note that in 50% or more of the subjects, each point or the nutrition cancelled the positive reaction, with the exception of the neurovascular reflex.

Treatment indicated by the positive tests was initiated. The ligament stretch reaction was removed with these approaches in fourteen of the sixteen patients. Two cases required specialized meridian therapy to abolish the positive ligament stretch reaction. "In all but one case, the symptoms of the patients were generally improved at the next office visit. In most cases, there was no recurrence of the ligament stretch/muscle weakness patterns. In the few where the pattern did recur, fewer reflex areas were found to be involved. Complete follow-up was not performed on this group."

There are many conditions and situations where testing for ligament stretch reaction is of clinical value. Durlacher[14] points out the importance of evaluating athletes for this reaction. Injuries similar to those found when a reactive muscle is present can develop. A rapidly moving individual places strain on the ligaments, appearing to cause immediate weakening of the muscles supporting the articulation just when they are needed. Under these circumstances, weakening appears to be the same as that observed when the articulation is stretched and manual muscle testing is performed immediately afterward. It is possible that the weakened muscle could even be more significant in an athletic endeavor, because muscle demand occurs at the same time the ligament is being stretched.

Although there is clinical evidence in applied kinesiology that the adrenal influences the ligaments through a biochemical association, the mechanism is not precisely known. Clinically it has been observed that patients susceptible to the ligament stretch reaction have exacerbations of symptoms when under considerable stress. Stress is cumulative, and can be classified as emotional, chemical, thermal, or physical. The athlete has some — and probably all — of these stress factors during competition. Clinical evidence shows that performance is superior, and injury less probable, when all factors known to influence the adrenal gland are functioning normally. This provides an opportunity for the stress of the endeavor to properly enhance performance and not be a possible cause of injury.

Usually, the ligament stretch reaction appears to be systemic, affecting all the ligaments of the body. Blaich[8] reported specificity of the ligament stretch reaction to the knee in acute and chronic problems; it may be limited to the problem knee rather than being a systemic phenomenon. Evaluation and correction are the same, whether the condition is systemic or limited to only one articulation, such as the knee.

EXAMINATION

Examination for a ligament stretch reaction is relatively simple; however, a few precautions must be taken. First, the muscle to be tested after the ligaments are stretched must be evaluated to determine its functional quality during a manual muscle test. If the muscle tests weak in the clear, it should be strengthened with the appropriate treatment. Its strength can then be compared after the ligament stretch has been done. If general testing of the body is to be done for the reaction, another muscle can be chosen.

The stretching procedure should be designed to limit the stretch to the ligaments of the articulation as much as possible. This can be done by tractioning the articulation, or attempting to move it in a direction of which it is usually incapable, such as attempting to laterally bend the knee. When attempting to stretch the ligaments, care must be taken not to go through a range of motion which stretches the articulation at the end of the motion; this stretches the muscles as well as the ligaments. A positive test may therefore be for muscle stretch reaction or ligament stretch reaction.

Care must also be taken that the weakening observed in a muscle is not the result of challenging the articulation; this could be erroneously interpreted as ligament stretch reaction. When there is a ligament stretch reaction, it will be in any direction the ligaments are stretched. In challenging the articulation, one vector of force will weaken the muscle while an opposing vector will strengthen it.

CORRECTION

The therapeutic effort is directed toward support of the adrenal gland. The appropriate reflexes and muscles described in this book should be evaluated, and corrected if involved. Nutritional support — usually in the form of

adrenal concentrate — is frequently of value. In some instances, the patient may require adrenal nucleoprotein extract.

Evaluation of stress and the entire endocrine system is important in treating the functional hypoadrenic. The individual should also be evaluated for possible blood sugar handling stress. (The endocrine system, blood sugar handling, and stress are discussed in Volume V.)

PRY Technique

Many procedures in applied kinesiology deal with organization of body function. Structural posture is composed of modules. The legs, pelvis, trunk, shoulder girdle, and head must all be integrated for structural efficiency and body economy during action. There has already been considerable discussion of proprioceptive communication and how lack of organization of articulations, muscles, etc., can create confusion within the signaling system, which is responsible for intercommunication within the body. Additional clinical information about organization of function appears to be revealed through manual muscle testing with the body in various positions and combinations of action, as is done in the PRY technique.

PRY is an acronym for pitch, roll, and yaw. These terms are used nautically and aeronautically to describe the position of a ship or airplane. Goodheart[22] has adopted these terms to describe the modular relationship among the various body parts.

The major thrust of research on the equilibrium proprioceptors has been to attempt to isolate activity, such as in spinal and decerebrate animals, or to help determine what facilitates activity in the normal body and to apply this information to muscle and nervous system rehabilitation following trauma or pathology. Hellebrandt et al.[29] studied the effects of the tonic neck reflexes in normal human subjects, which revealed facilitation and inhibition of the limbs with various head positions. In another study,[30] she observed how head and limb positions were subconsciously used by subjects for apparent facilitation of arm strength during maximal levels of exercise stress. These studies show the integration of postural and equilibrium reflexes during normal body function.

Understanding how head position can influence the limbs and modules of the body gives better appreciation of how disturbance of these receptors can influence body organization. A subluxation in the occiput-atlas-axis area apparently disturbs the neck reflexes. Because of their interaction with other equilibrium and organizational reflexes, significant disturbance may develop in areas other than the neck.

Typical examples of the equilibrium reflexes can be seen in close observation of animals during their daily activities. An animal's head position facilitates and inhibits muscles for purposeful function.[7] A cat looking at a bird in a tree extends its forelimbs and flexes its hind limbs in a sitting position. This decreases the required extension of its neck, and places its body in position to spring toward the bird should the occasion arise. Flexion of the neck, as in looking into a mousehole, causes flexion of the forelimbs and extension of the hind limbs, again equating the body with the head. As an animal turns a corner, its eyes, head, and neck turn, causing stimulation of proprioceptors which appears to facilitate and inhibit muscles for the integrated completion of the activity.

Stejskal[47] electromyographically demonstrated the influence of head rotation on trunk rotation, as well as deviation of the arms. The asymmetric deep neck reflexes did not appear to be the decisive stimulus influencing the activity in the shoulder girdle; rather, the movement of the eyes appeared to overcome the asymmetric deep neck reflexes in both spastic patients and healthy subjects. These principles are used in motor re-education for paralysis and other pathological conditions.

Feldenkrais[15] discusses the role of the eyes in movement organization of the body. He presents several activities for improving coordination of eye and body movement. He states that ". . . the movement of the eyes in opposite direction to that of the head — and movement of the head in opposite direction to that of the body — add a dimension of movement of which many are not aware." He goes on to point out that ". . . most parts of the body have two functions: the mouth serves for eating and speaking, the nose for smelling and breathing. The inner ear is instrumental in balancing the body in both slow and rapid movement, in addition to its role in hearing. Similarly, the muscles of the eyes and the neck have a decisive influence on the manner in which the neck muscles contract."

Goodheart[21] demonstrates the influence of eye activity on body motion by having an individual twist his trunk in the standing position, with and without eye movement. In the standing position, the shoulders are flexed to 90° so the arms are outstretched directly in front. The fingers are aligned with some object to obtain a constant reference point for the starting position in subsequent activities. From this position, the body (including the head) is twisted as far to the right as possible without moving the feet, noting the amount of twist. Next, the trunk (including the head) is rotated to the left; note the extent of rotation. This motion is repeated several times, both right and left. There will usually be a slight increase in twisting ability as the trunk loosens and stretches. When maximum rotation has been obtained, rotate once to the left but turn the eyes to the right. After completion of this twisting motion with opposite eye movement, the body is twisted to the right with usual eye movement. A considerable increase in twisting ability will usually be observed. The repeated rotation prior to the eye movement change revealed no increase of range of motion after the general stretching of

the body had been accomplished. Continued rotation after this point showed a consistent range of motion available during the twisting procedure. The addition of the eye movement in the opposite direction increases the range of motion on the next rotation.

Equilibrium reflexes have been primarily studied in regard to the labyrinthine, visual righting, and neck reflexes. There is some reference to body-on-head reflexes and body-on-body righting reflexes.[24] The possibility of equilibrium reflexes being located in the sacroiliac articulations seems to be an area which has received little study. Clinical evidence of postural pattern changes, range of motion, and general body organization from sacroiliac manipulation makes it appear that there are proprioceptors in the sacroiliac equating to those of the upper cervical area described by Magnus[33] and later located by McCouch et al.[35] Research directed to the receptors in the sacroiliac region should prove fruitful in delineating the mechanism observed clinically by applied kinesiology findings.

The PRY technique in applied kinesiology attempts to evaluate the organization of body modules and their integrating capability. Lack of integration appears to be the result of improper proprioceptive signaling from the various articulations and equilibrium reflexes involved. Evidence that corrections described in the PRY technique influence the modular organization of the body is observed in the increased range of motion frequently obtained in articulations remote from the area where therapy is administered. It also usually improves postural balance.

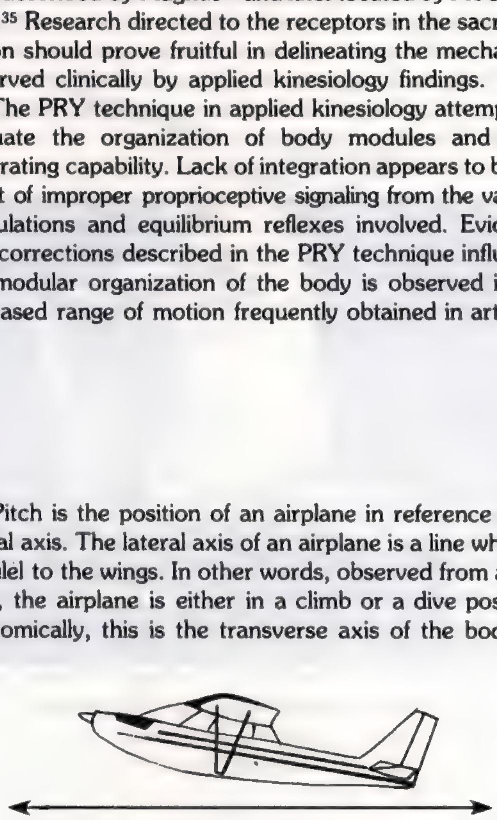
The PRY technique deals primarily with the upper cervical and occiput relationship, and with the pelvis. Integration of these structures with each other has significant bearing on total body function. Many vertebral subluxations, fixations, and curvatures will be influenced by applying correction to adverse findings in the positions of pitch, roll, and yaw. Range of motion in the spinal column is generally increased because of improved organization.

Sometimes therapy is directed to the wrong area. An occiput lateral to the atlas gives a tilted head appearance. Manipulation to this area may or may not be indicated. In order to level the head, it is necessary to level the sacrum if it is primary. The same appears true of twisted patterns of the body. If the pelvis is in torsion, the spinal column, shoulder girdle, and head will probably also show torsion.

It appears that all the equilibrium reflexes interact with each other, and improper signaling from any one can cause structural and functional disturbances throughout the body. The PRY technique is one method of evaluating organization between sections of the body by testing the ability to integrate different motions without functional disturbance. The use of challenge determines the corrective procedures needed. Clinical observation of improved function on manual muscle testing and postural balance supports the examination procedures outlined in the PRY technique.

PITCH

Pitch is the position of an airplane in reference to its lateral axis. The lateral axis of an airplane is a line which is parallel to the wings. In other words, observed from a side view, the airplane is either in a climb or a dive position. Anatomically, this is the transverse axis of the body.



11—18. Pitch position for climb.

In applied kinesiology, pitch is observed from the lateral position. It is the comparison of the modules of the body on a flexion-extension basis. The reference is to rotation of modules pivoting about an axis drawn transversely from right to left through a module, such as anterior or posterior pelvic tilt or head flexion or extension. If the modules are disturbed in this position, the body is probably influenced in its vertical alignment.

Characteristics of the pitch problem are seen in an individual with poor organization of flexion and extension of the head and pelvis with the rest of the body. Goodheart makes a correlative analysis of body organization by

11—19. Body disorganization in pitch analysis.

comparing the symphysis menti of the mandible and the symphysis pubis of the pelvis as the "two chins of the body." He sees a correlation that when the postural balance is disturbed so that the head is flexed on the neck, the chin of the jaw is inferior. It follows that the pelvis is in an adaptive position so that the chin of the pelvis is inferior. If the pelvis is primarily tilted anterior, then the head would follow as a secondary involvement.

The postural pattern is observed from the lateral view in pelvic and head tilt positions of either excessive flexion or extension. The finding is generally excessive flexion; consequently, the patient typically avoids positions in which it is necessary to look up for a prolonged period of time, e.g., sitting close to the screen at a movie or looking at an elevated television set.

Limited flexion or extension of the cervical spine may be observed. This is generally in the occiput-atlas range of motion. Abnormal positioning of the atlas is frequently observed on x-ray. The posterior arch is either inferior or superior, depending upon whether the condition relates with flexion or extension problems.

For some reason, there is generally limitation of femoral head motion associated with this condition, and it is noted during ambulation. This can be evaluated by observing abduction of the supine patient's hip and noting the maximum range of motion. Because of the limited range of hip motion, there is generally a decreased stride when walking.

Examination

The patient is examined in the supine position to evaluate flexion of the head on the neck and neck on the trunk, while simultaneously flexing the legs with the pelvis. First, the hips and knees are flexed, with the feet resting on the examination table. This should cause no weakening of a previously strong indicator muscle. The patient then lifts his head from the table, flexing head on neck. A previously strong indicator muscle is tested for weakening. Generally, bilateral pectoralis major (clavicular division) muscles are tested; however, it appears that any available indicator muscle can be tested. In the presence of a positive pitch pattern, the indicator muscle will weaken on manual muscle testing.

The head and neck position is the same as that of atlas-on-occiput flexion described on page 83, but the test differs from the rocker motion test by the addition of hip flexion. Testing the atlas-on-occiput flexion while the hips are flexed on the pelvis gives positive findings when the neck/head test alone does not. This combined testing appears to test the ability of body modules to work together. Most positive pitch patterns are found on flexion; however, in some cases extension can be positive.

11—20. Position for testing flexion

To evaluate for extension, the supine patient drops his legs over the right and left edges of the examination table, in effect extending the legs on the hips. This requires a relatively narrow examination table. An alternate method is to place a relatively thick, firm, and long pillow under the patient's pelvis and trunk. The head is extended on the neck, while the patient holds his head away from the table. This is the same position as the atlas-on-occiput extension; however, the test will not be positive without the leg-on-pelvis extension. An alternate method is for the patient to extend his head over the end of the table. This will show some positive findings when the usual position of atlas-on-occiput extension will not.

11—21. Position for evaluating extension

Correction

Therapeutic efforts for either flexion or extension are directed to the occiput-neck complex. For flexion, the correction is the same as that used for occiput-on-atlas flexion. In this case, the doctor stabilizes the patient's head with a broad contact over the temporal regions, his fingers extending in front of and behind the patient's ear. While his head is held in this position, the patient attempts to flex it on his neck as the doctor resists the patient's efforts to do so. This is repeated four or five times, with maximum isometric contraction by the patient.

Extension correction is obtained the same as occiput-on-atlas extension. Here the doctor stabilizes the patient's head with the same broad contact. The patient attempts to extend his head on his neck as the doctor resists efforts to do so. The activity is repeated four or five times.

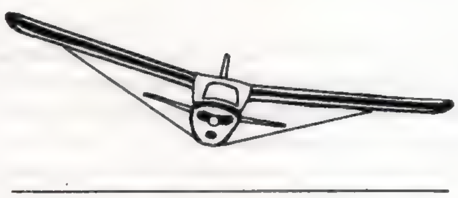
After the corrective effort, the patient should be re-evaluated in either the flexion or extension position. There

should now be no weakening of an indicator muscle. The patient's range of motion at the hip is generally greatly increased.

The range of hip motion may also be adversely influenced by shortened muscles which are positive on the muscle stretch test and require fascial release or spray and stretch technique. Some proprioceptive therapy may also be needed to gain full range of motion. Additional treatment is generally needed when the condition is chronic. Improved posture will generally be observed from the lateral view, with emphasis on pelvic and head position.

ROLL

Roll refers to the position of an airplane along its longitudinal axis. Looking at the airplane from the front, roll could be seen as the wings not being level. The longitudinal axis of an airplane is the same anatomically as an A to P axis in the transverse plane.

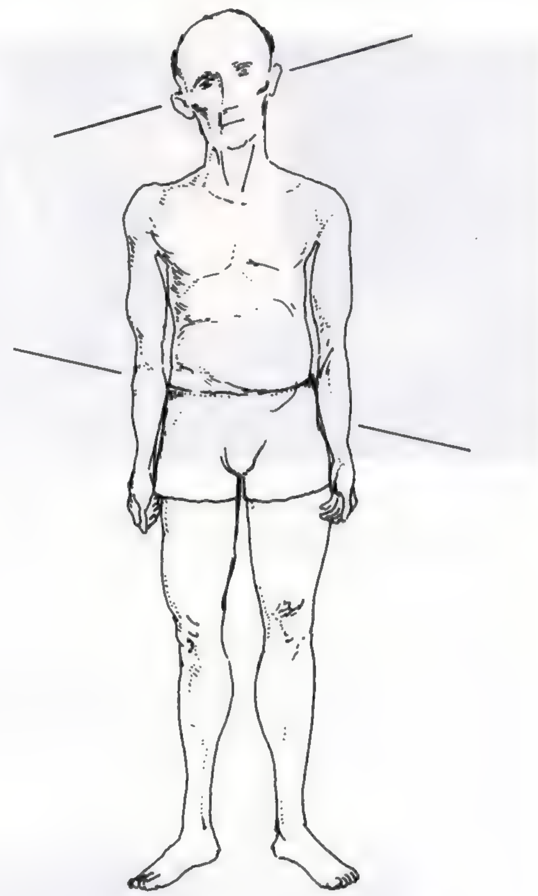


11—22. Position of airplane in roll.

Roll is demonstrated in the body when modules are not level when viewed anterior to posterior, or posterior to anterior. This condition has also been referred to as "oculo-basic." "Oculo" represents the visual righting reflexes, and "basic" is the basic technique for sacral and spinal treatment. The muscle weakening that develops with the roll pattern is temporarily abolished by turning the eyes laterally. The therapeutic approach is modeled somewhat after the basic technique for the sacrum.

The symptomatic pattern indicating need for this evaluation is one of considerable stress throughout body structure. There may be an imbalance of the cervical musculature and strain throughout the thorax and shoulder girdle, as well as low back pain and general spinal problems. Postural evaluation will show a failure of body modules to align horizontally, as viewed A-P or P-A.

Evaluation of gait generally shows an asymmetric lateral sway, or a tilting of the head. As an individual walks, pelvis elevation may not be symmetrical.



11—23. Lack of modular alignment typical of roll pattern.

Examination

Prior to examination for the roll pattern, several factors must be evaluated, and corrected if found positive. Ocular lock and switching should be considered, since eye movement is an integral part of this condition and its evaluation. Muscular balance of the neck and pelvis, as well as general pelvic balance, should be evaluated and corrected if not functioning properly.

The patient is examined in the supine position (11—24). Hips and knees are flexed so that the patient's feet are resting on the table. Both knees are moved together. The femur on the side to which the knees are moved is in a flexed, abducted, and laterally rotated position, while the opposite femur is in a flexed, abducted, medially rotated position. This places a torque into the hips, pelvis, and sacroiliac articulations. Apparently the proprioceptive network and its communication with other factors concerning equilibrium and body organization is challenged. Numerous muscles are stretched in this position. Of particular interest is the movement of the leg which crosses the midline, placing stretch on the piriformis muscle; this muscle is thought to be important in the sacral stabilization suspected to be a major factor in this evaluation.

While the patient's legs are in this position, a previously strong indicator muscle is tested. Usually bilateral pectoralis major (clavicular division) muscles are tested; however, it appears that any strong indicator muscle can be used. Weakening indicates a possible positive roll condition.

The second step supports the hypothesis that this mechanism is integrated with the equilibrium or body-organizing complex. While the patient maintains the leg position, he turns his eyes laterally, causing the weak indicator muscle to strengthen. The regained strength may be from right or left eye movement, or both. The eye involvement appears to indicate that the visual righting reflexes are involved in the complex.

11—24. Position to test for roll. Lateralization of eyes in one or the other direction cancels weakening of indicator muscle(s).

Correction

Correction is directed to the sacrum in the prone position. Determination should be made for the side and direction of correction, and whether it will be made on inspiration or expiration.

The sacrum is challenged with a Logan Basic-type contact. The pelvis is placed in an elevated position, and the examiner contacts the lateral aspect of the sacrococcygeal junction, directing pressure cephalad. A previously strong indicator muscle(s) is tested, usually the hamstring group. There should be no weakening with this challenge; if there is, the patient should be re-evaluated for standard varieties of sacral primary respiratory dysfunction. If there is no weakening with this challenge, the patient turns his eyes, first to the right and then to the left. The indicator muscle is tested while the eyes are held in a lateral position. Weakening of the indicator muscle determines a positive challenge on that side. The opposite side is challenged in a similar manner. There will usually be a positive challenge on one side only, indicating the side of correction. In a rare situation where both sides weaken, the side causing the greater change in the indicator muscle is the one which needs correction.

The direction of correction is determined while there is a positive challenge with eye lateralization. As the examiner continues to hold the challenge, the patient maintains the lateral eye position. One phase of respiration will cause the indicator muscle to strengthen; this is the phase on which correction should be attempted.

To summarize the challenge for determining correction, first challenge cephalad at the sacrococcygeal junction. Test a muscle; no weakening should occur. Second, turn the eyes laterally; if the muscle weakens, the challenge is positive. Third, while the patient continues to hold his eyes laterally and the indicator muscle is weak, test the muscle on the patient's inspiration and then on expiration to determine which strengthens the muscle. Fourth, test both sides. The one giving positive muscle reaction is the one for treatment. Fifth, pressure is directed to the lateral aspect of the sacrococcygeal junction, cephalad and slightly anterior for inspiration, or cephalad and slightly posterior for expiration.

11—25. Indicator muscle weakens when challenge pressure is held as patient lateralizes the eyes. Side of positive challenge and eye lateralization indicates side for treatment.

If the complex of challenge and eye lateralization was neutralized by an inspiration, the examiner contacts the sacrococcygeal articulation and presses it cephalad and slightly anterior while the patient takes a slow, deep inspiration. This is repeated for approximately two minutes, during which the patient will often feel a significant relaxation taking place throughout the pelvis, trunk, and neck musculature.

If the positive challenge and eye lateralization complex was neutralized by expiration — as happens occasionally — a basic contact is used with expiration as the sacrum is pressed cephalad and slightly posterior.

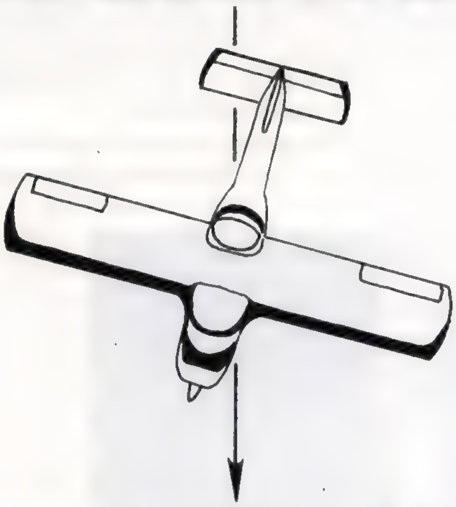
Alternate Testing Procedure

This test can also be done in the prone position by having the patient flex one knee and rotate the thigh laterally. Test the opposite hamstring group for weakening. If present, have the patient move his eyes laterally to determine if the weakening is neutralized. Repeat on the opposite side. The prone testing position does not appear to be as effective as the supine method.

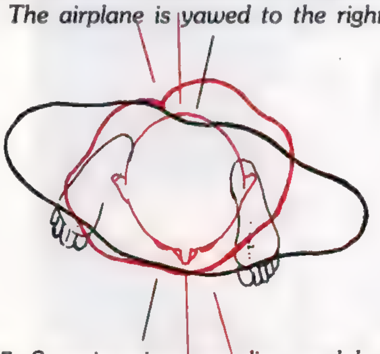
After correction, testing of hip and pelvic rotation should be negative. There will generally be a significant improvement in posture, gait, head-leveling, and pelvic stress. Also, the patient will frequently have greater capability of flexing forward at the hips when in the standing position.

YAW

Yaw describes the rotation of an airplane along its vertical axis in reference to the direction of flight. Stated differently, if the airplane is not aligned with its horizontal direction of flight, it is said to be in a "yaw" position. Yaw, then, refers to the body modules rotating about the vertical axis. The most obvious distortion in the yaw pattern is head rotation. The shoulder girdle will appear to be forward on one side in relation to the foot position and pelvis. This is easily seen when one arm hangs slightly forward. The pelvis may show a rotation over the foot position. In the presence of yaw, there may be a decreased forward flexion of the trunk, as in Adam's position. This is probably due to an inability of the lumbar vertebrae to rotate as flexion takes place, as was described by Illi.[31] This condition is also frequently involved in recurrent subluxations and fixations of the spinal column. There is generally a considerable amount of discomfort from strain and tension throughout the trunk, and possibly in the extremities.



11—26. The arrow indicates the direction of flight. The airplane is yawed to the right.



11—27. Superior view revealing module displacement about the vertical axis of the body.

Hip motion is limited in this condition, as with pitch, and it should be evaluated in a similar manner. In an effort to understand some of the factors taking place in the correction of this condition, Goodheart has recorded temperature elevating over the femoral head as correction is being accomplished.

There are two patterns of yaw described. One is yaw-occiput, which apparently deals with the occiput position in relation to the atlas. The other is yaw-sacral, which deals with the sacral position in relation to the ilium. Correction is directed respectively to the occiput or sacrum.

Yaw-Occiput — Examination

The supine patient's legs are flexed at the hips and knees, with the feet on the table. The pelvic and hip

11—28. Testing position for yaw-occiput.

complex is then rotated by moving both knees laterally, which is the same position used in the supine roll test. The patient's head is then turned in the direction opposite the knee position. A previously strong indicator muscle is tested for weakening, which is a positive finding. Again, the bilateral pectoralis major (clavicular division) muscles are usually tested; however, any previously strong available muscle may be used.

Yaw-Occiput — Correction

A different type of atlas-occiput fixation is present from that described under "Fixations." It appears that the fixation is on one side of the complex only. In any event, there is no evidence of an atlas-occiput fixation with the usual method of testing for bilateral psoas weakness. There will be a fixation which will challenge between the atlas and occiput on one side, but not on the other. The side will generally be the one which is up when the patient has his head and neck in rotation for the initial testing phase. The challenge is accomplished by holding the atlas on the anterior aspect of the transverse process, while pressing the occiput anterior.

The adjusting procedure is the same as that usually done for an occiput fixation. Palpate along the inferior nuchal line of the occiput, where an extremely tender point will be located. This appears to be the optimum point of contact, which is made with the lateral aspect of the 1st metacarpophalangeal area of the doctor's hand. It is best to keep the patient's neck and head in a straight position. This helps prevent any disturbance in the cervical spine and creation of an iatrogenic problem. The line of drive is from the tender point on the occiput to the glabella or bridge of the nose. After correction, the indicator muscle should not weaken when the pelvis and head are rotated opposite.

Yaw-Sacral — Examination

With the patient prone, DeJarnette blocks are placed obliquely under the anterior superior iliac spine of the pelvis on one side, and the shoulder girdle on the opposite side. In the presence of the sacral yaw pattern, a previously strong indicator muscle(s) weakens. If a pelvic block is placed under only the pelvis or the shoulder girdle, there is usually no change in muscle strength. The muscle group generally used for this testing is the hamstrings; however, any available indicator muscle can be used. The test relates to the sacroiliac articulation on the side where the pelvis is blocked. The test is repeated on both sides; only one side should be positive. If both sides are positive, the patient should be tested for sacral wobble (see Volume II) or some other type of involvement.

A sacral involvement is usually indicated on the blocked pelvic side. Upon therapy localizing to that sacroiliac, the indicator muscle(s) which weakened on the block-torquing test will strengthen. Generally, only therapy localization to that sacroiliac will change the strength of the indicator muscle when the mechanism is evaluated in this manner.

The visual righting reflexes also appear to be involved in this complex. Holding the eyes in a lateral position, either right or left, will cause the indicator muscle(s) which weakened to strengthen.

Yaw-Sacral — Correction

First, the muscles of the pelvis should be evaluated for normal function, especially the piriformis, which is often involved with sacral problems. If there is muscular imbalance, use the AK techniques to regain their integrity. This is important because muscular balance is a prerequisite for maintaining the manipulative corrections.

Correction is obtained by adjusting the sacrum from posterior to anterior on the positive side. The adjustment

11—29. Sacral adjustment. Patient's involved side is up. Patient's leg presses against examiner's in an inferior direction.

can be made with almost any of the methods used for a posterior sacrum, such as manipulation on a Thompson terminal point table or in a side-lying position.

Goodheart describes a method with the patient side-lying, involved side up. The patient lies in a straight position, with minimal lumbar curve and the shoulders in vertical alignment. The lower leg is in a straight, neutral position. The upper hip is flexed to 90°, and the knee is in maximum flexion. The thigh parallels the floor in this flexed position. The doctor stands between the patient's legs so the patient's upper leg contacts the doctor's leg. The patient presses his flexed leg against the examiner's as the doctor contacts the sacrum with the pisiform or thenar eminence immediately medial to the posterior superior iliac spine. He stabilizes the patient's shoulder with his other hand. The adjustment is made in a posterior-to-anterior direction, with the patient maintaining the pressure of his leg against the doctor's.

After correction of the sacrum, there should no longer be a positive finding when the patient's pelvis and shoulder are obliquely blocked on either side.

Efficient Clinical Testing for PRY Pattern

Various phases of testing for the different PRY patterns can be done in a sequence out of order from that previously described for efficient office time management. The positions will be described, and the pattern being tested will be named. For each position, test a previously strong indicator muscle(s), which is usually the bilateral pectoralis major (clavicular division).

1. Patient flexes knees, hips, head, and neck on trunk. Test for flexion pattern of pitch aspect. Extension testing is optional.
2. Patient maintains hip and knees in flexion with feet on the table, and laterally moves the knees to rotate the pelvis. This is the initial test for roll pattern. Lateralize the eyes, if positive.
3. While maintaining knees laterally, the head is rotated in the opposite direction. This position tests for the yaw-occiput.
4. Repeat steps 2 and 3 to evaluate bilaterally.
5. Test for yaw-sacral in prone position.

RIB AND SPINAL FIXATION
"Limbic Technique"

Frequently when aspects of pitch, roll, or yaw dysfunction are present, there are rib fixations which tend to follow a specific pattern. Routine evaluation for these patterns is of value, because failure to correct them may cause recidivism of the effectively treated PRY factor.

Examination

The primary location of this type of fixation is between the lower cervical and 1st rib areas. It can be evaluated by challenge and therapy localization as generally used in fixation technique (described in Chapter 6). The area which most frequently challenges positively is the 7th cervical verbetra and the posterior aspect of the 1st rib. They are contacted and challenged away from each other. For the right side, the contact would be on the right aspect of the 7th cervical spinous process and on the 1st rib proximal to its angle. The challenge on the vertebra is from right to left, with a slight cephalad direction; the rib is simultaneously challenged laterally and slightly inferiorly. The area will not therapy localize until the patient attempts mobilization by turning the head right and left while holding the therapy localization. A previously strong indicator muscle will weaken on manual muscle testing if a fixation is present.

Typically there is muscular weakness when this fixation complex occurs. It is somewhat broader than the specific bilateral muscle weakness found with other fixations. It is clinically observed that the order of frequency of weakness is the peroneus tertius, peroneus longus and brevis, tibialis anterior, and tibialis posterior. Upon correction, the muscles will strengthen if no other factors are involved. This again gives evidence of the total postural modular role of the PRY technique and its associated findings.

Correction

Fixation correction typically requires a two-handed contact. This can sometimes be accomplished in this situation; however, it is easier to use a thumb contact on the 7th cervical verbetra, briskly adjusting it in the direction of positive challenge. Next, adjust the rib by using a pisiform contact proximal to the angle in the direction of challenge. There will usually be a significant audible release with both adjustments; however, it is not necessary for an effective correction.

Correction of this fixation is important in maintaining the corrections obtained with the PRY technique. There often is an improvement in the patient's energy level following the successful correction of this fixation complex, as well as those associated with it and discussed below.

Other Fixations

When the 1st rib-7th cervical fixation complex is present, there is often a positive relationship similar to that of the Lovett Brother. The fixation level in the lower area will generally be the 1st lumbar with the 12th rib. The fixation may or may not be found on the same side as the fixation between the 7th cervical and 1st rib; it is possible to find it bilaterally. Occasionally the 12th thoracic and 11th rib can be involved. Again, the area will not show positive therapy localization until the patient attempts to move the area by flexing, extending, or laterally bending the spine while therapy localization is held. A previously strong indicator muscle will weaken with motion. The structures will challenge with a two-handed activity, similar to that described for the upper area.

Correction is obtained with a spinous process contact on the vertebra, and rib contact with the opposite hand. Generally these adjustments can be made simultaneously with a quick, thrusting action in the direction of positive challenge.

There often appears to be hypertonicity of the serratus

posterior inferior and superior muscles. They can be therapy localized and treated with muscle spindle cell technique for relaxation.

All of the vertebrae and their associations with the ribs should be evaluated bilaterally for fixations. Their presence is common when PRY technique is required, and they can be tested for rapidly. Challenge the rib and vertebra as described above. When fixations are found, they are corrected in the same manner, and attention should be given to the levator costarum muscles.

Prior to the original observation of the 7th cervical-1st rib fixation, Goodheart[22] noted an unusual phenomenon when an individual showed a positive therapy localization when he touched his nose. The positive therapy localization was cancelled if the individual turned his head to the right or left. This posed the question whether the positive therapy localization to the nose is associated with the sense of smell. On the other hand, since head and neck rotation cancelled the positive therapy localization, the proprioceptors and equilibrium mechanism of this area might be involved.

Goodheart found that correction of the 7th cervical-1st rib fixation abolished the positive therapy localization to the nose. This fixation also appeared to be significant in the PRY technique, whether it was pitch, roll, or yaw. Since the PRY technique seems to be involved with the more primitive righting reflexes of the equilibrium mechanism, it was hypothesized that the nose therapy localization might also interact in a primitive way. A hypothetical model was developed, which Goodheart calls the "limbic technique."

In 1952, Paul MacLean[32] applied the term "limbic system" to what had been previously known as the rhinencephalon, or "nose brain." Its original name was derived from an earlier concept that its major purpose was for smelling. This was because of the large number of nerve fibers of olfaction. MacLean has described three stages of development of the nervous system. The R-complex, or reptilian stage, is the earliest development of the nervous system. The second stage of development is the paleomammalian stage, which is the limbic system; it is now understood to have greater function than olfaction alone. The final stage is the neo-mammalian, which equates with the human nervous system.

Olfaction is not a major factor in the human's existence; it is much more important in lower animals. Goodheart associated the possibility of the unusual therapy localization to the nose being like the potential of the PRY technique equating with lower form reflexes. There could be a lower form reflex exhibited in the extensive connections of the limbic system and olfactory nerves with the neck. In lower animals, the detection of a scent causes an immediate head-turn in various directions to determine its source. This seems to tie into the positive therapy localization to the nose being cancelled by a head turn. The total pattern is eliminated by the correction of the fixation at the 7th cervical-1st rib area. The model associating these lower form reflexes is very interesting.

Cloacal Synchronization Technique

A technique developed by Goodheart[19] which appears to influence the equilibrium and centering reflexes has been found clinically valuable in many conditions indicating neurologic disorganization. The technique is thought to synchronize activity of the anterior and posterior cloacal reflexes with that of the visual righting, tonic neck, and labyrinthine reflexes. Cloacal reflexes appear to be primitive centering reflexes; they are described on page 192.

Points have been located for therapy localizing these reflexes, which is one method of diagnosing their involvement. Beardall[5] applied a system of muscle testing to the technique which shows muscle weakening on combined group testing. These tests coincide on a clinical basis with the positive therapy localization noted by Goodheart.

Body language indicating need for evaluation of cloacal synchronization is any structural organizational problem which manifests itself in the postural pattern, gait, general organization between modules of the body, or general lack of smooth, coordinated movement. The presence of poor synchronization between these reflexes often causes recurrent switching in the patient. Ideally, once switching has been corrected, the problem should never return.

The pattern of homolateral crawl was described in Chapter 8 and is more thoroughly discussed in Volume V. This type of neurologic disorganization is found in individuals who usually have heightened sensory input. The cloacal synchronization technique has been clinically found to be a common factor which changes an individual from the homolateral crawl pattern to the standard cross crawl pattern.

Gunn,[25] in a paper entitled "'Switching' — A Compensating Response," refers to the probability that the body is never in a state of "confusion"; that when the systems appear to be confused, there are in reality compensating mechanisms taking place to maintain body function. He refers to Beardall's[5] statement that the body is full of compensations and has back-up systems for back-up systems. This certainly appears to be true, and most investigators in applied kinesiology seem to support this view. As more is learned, conditions appearing to be a confused body state are being classified as predictable, understandable patterns which can be examined in a methodical manner to determine what correction is needed for return of normal organization.

Beardall[5] reported that proper treatment for cloacal synchronization and gait mechanism permanently corrected switching. Gunn[25] confirmed Beardall's findings in a study of over 200 patients who were switched and had

involvement of either the cloacal or gait reflex, or both. This study also revealed that correction of these involvements eliminated many other problems or apparent lesions without treatment. This appears to indicate that many of the problems were secondary to a primary involvement of the cloacal synchronization or gait mechanism.

EXAMINATION

Involved with cloacal synchronization are the anterior and posterior cloacal, visual righting, tonic neck, and labyrinthine reflexes. There are many techniques in applied kinesiology which appear to influence these reflexes. Clinical evidence shows that when they are not functioning correctly — for whatever reason — homeostasis and general integration of the body is disturbed.

Labyrinthine Reflexes

The labyrinthine receptors, located in the middle ear, are made up of semi-circular canals and utricles. In an adult, the receptors in the utricles are termed the labyrinthine righting reflexes, and are involved with orienting the head correctly with gravity. Their action is directed to contraction of neck muscles, with influences to the trunk and limb muscles. The receptors in the semi-circular canals are involved with equilibrium. Their impulses are directed to the anti-gravity muscles, particularly the limb and neck extensors. Specific movements of the head stimulate the semi-circular canals in such a manner that various flexor and extensor muscles of the extremities are facilitated.

The influence of the labyrinthine reflexes on body organization is well documented. Carpenter et al.[10] reported that following a bilateral labyrinthectomy, most animals were able to sit but none could walk. Approximately one week after surgery the animals began to walk, but the gait was broad-based; they leaned and staggered, first to one side and then the other. The gait was slow, insecure, and hesitant.

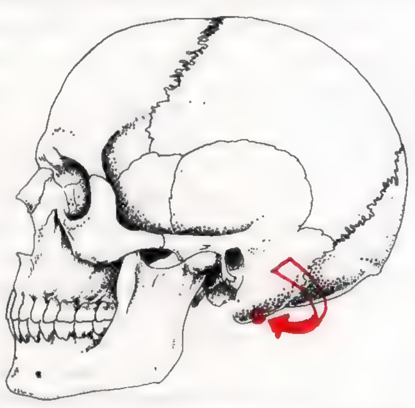
It seems obvious that if improper signaling develops from the labyrinthine receptors, a disturbance in balance and postural muscles will result. Clinical evidence supports the hypothesis that the cranial primary respiratory system may be at fault in problems relating to the labyrinthine mechanism, as stated by Magoun.[34] When examination shows need for synchronizing the cloacal with the labyrinth mechanism, examination should also be made of the cranial primary respiratory system. (This is discussed in Volume II.)

The point for therapy localizing and the treatment contact for the labyrinthine reflex is the digastric fossa of the temporal bone, where the digastric muscle attaches. This point is medial to the attachment of the splenius capitis and longus capitis at the most superior section of the fossa. This point probably also therapy localizes some of the skin receptors involved with the body-on-head and neck righting reflexes.

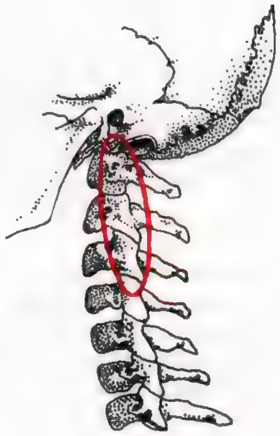
Neck Righting Reflexes

Neck righting reflexes are the mature tonic neck reflexes found in the infant. McCouch et al.,[35] in a study of labyrinthectomized decerebrate cats, found the receptors for the tonic neck reflexes to be in the upper joints of the neck, especially the atlantoaxial and occipitoatlantal articulations. Unimpaired reflex is retained after surgical elimination of the muscular and cutaneous branches of the first three cervical nerves and resection and denervation of the muscles, indicating there is no contribution from the muscle or skin to this specific reflex. It seems important, however, to consider that research was done on decerebrate labyrinthectomized animals in a laboratory situation, rather than a study of integration of the total system.

Cohen[11] demonstrated the importance of the neck proprioceptive mechanism in body orientation and motor coordination by anesthetizing the dorsal roots of C1, 2, and 3. The animals exhibited severe disorientation, imbalance, and therefore motor incoordination. He compared



11—30. Therapy localization point for labyrinthine reflexes, medial to mastoid process.



11—31. Therapy localization point for neck righting reflexes.

these animals' symptoms with the classic descriptions of labyrinthectomized animals.

Evidence of the neck proprioceptors' influence on total body organization, and their receptors' location in the upper cervical articulation, places increased importance on evaluating this area for possible subluxations or pathology when there is body disorganization. The various aspects of the PRY technique (described in this chapter) should be evaluated when examination shows a need for synchronization of the neck righting and cloacal reflexes.

The neck righting reflexes are therapy localized at the occipitoatlantal, atlantoaxial, and sometimes at the axis-3rd cervical articulations. It must be remembered that therapy localization only tells that something is involved in an area, not necessarily **what** is involved. If there is positive therapy localization to this point, or to any other point in the reflexes being discussed, further testing with muscle combinations as described below should be done to verify the association of the positive therapy localization.

Visual Righting Reflexes

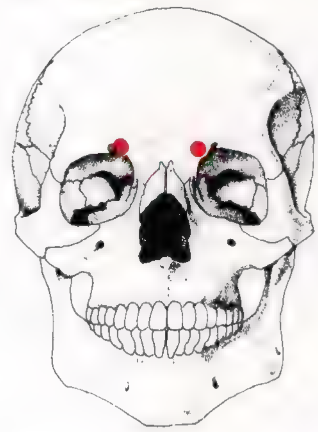
The eyes, via the visual righting reflexes, provide signaling which is important to optimum function of the body's organization and orientation in space. It is possible for a blind person to function adequately; however, note the disorganization of the body modules. The head is typically not placed on the neck, neck on trunk, trunk on pelvis, etc., in a balanced manner, resulting in other disorganization.

Cohen[11] evaluated the visual righting reflexes in decerebrate labyrinthectomized cats. He found that when the extraocular muscles of the right eye were detached, there was no observable defect in balance, orientation, or motor coordination. Nor did paralyzing the ciliary muscle cause disorientation or motor disability. He did observe that the animals were less active, with slow and methodical movements. Other intact balance and orientation mechanisms were able to take over in non-stressful situations.

The visual righting reflexes are therapy localized and contacted for synchronization treatment medial to the supraorbital notch of the supraorbital margin. When the visual righting reflexes fail to synchronize with the other reflexes mentioned here, a previously strong indicator muscle will weaken when therapy localized at the point described.

An interesting factor about the visual righting reflex therapy localization is that it is present only with the eyes open. If the patient closes his eyes, the weakened indicator muscle will again strengthen with continued therapy localization to this point. This is an important differential diagnosis factor. There are other receptors in the area which could possibly be mistaken for a visual righting reflex, such as the stress receptors.

Clinical evidence that the visual righting reflexes are organized with the labyrinthine and tonic neck reflexes is seen by the change in positive therapy localization when either of these latter reflexes is positive. Therapy localization to the labyrinthine or neck reflex, causing a previously strong indicator muscle to weaken on manual muscle testing, will be abolished if the patient closes his eyes. The experiments noted show that laboratory animals' locomotion is not greatly disturbed when the extraocular muscles are severed and the ciliary muscle is paralyzed. It seems reasonable that effective communication between the visual righting reflexes and the labyrinthine and neck reflexes is necessary for optimum function. Wilson[55] describes the pathways from the labyrinthine receptors to the vestibular nuclei, which act as a relay to the spinal cord or extraocular neurons.



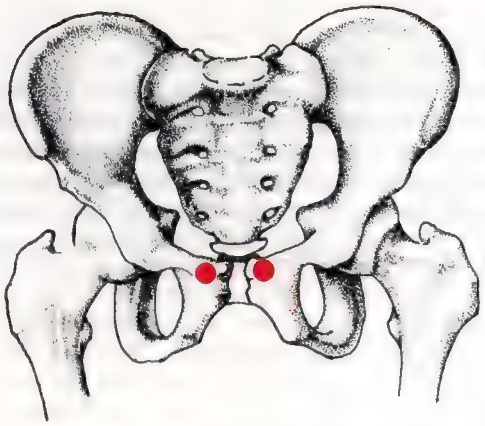
11—32. Therapy localization point for visual righting reflexes.

Cloacal Reflexes

The cloacal reflexes have been studied by many investigators and appear to be the basis for several types of spinal balancing techniques. The word "cloaca" literally means sewer; in lower forms of phylogeny, it is the combined anal, urinary, and reproductive organ. The reflexes are thought to be centering reflexes for reproductive genital contact in lower forms of animals. An observation has been made by Watkins[53] that dermal stimulation over the medial aspect of the gluteus maximus causes a cow to move her pelvis toward the stimulation, whereas dermal stimulation on the lateral aspect of the gluteus maximus causes the cow to move away from the stimulation. It is suspected that in the human there are both anterior and posterior cloacal reflexes because of the separation of the genital and anal areas.

Anterior Cloacal Reflex. Beardall[5] specifically locates the cloacal reflexes from applied kinesiology clinical evidence. The anterior cloacal reflex is on the anterior external surface of the superior ramus of the pubis, below the origin of the pectineus, and lateral to the origin of the adductor longus along the superior border of the obturator foramen. This is the location for therapy localization and also contact for treatment.

Posterior Cloacal Reflex. The therapy localization and treatment point for the posterior cloacal reflex is the sacral tuberous ligament attachment point on the 4th and 5th transverse tubercles of the sacrum and the lateral margins of the coccyx.



11—33. Therapy localization point for anterior cloacal reflex.

11—34. Posterior cloacal reflex point for therapy localization.

MUSCLE TESTING

Identification of the need for synchronization technique is accomplished through combination muscle tests developed by Beardall.[5] Positive muscle tests should correlate with positive therapy localization at the appropriate point for the muscle combination. The muscle tests use combinations of the patient's effort toward hip flexion while simultaneously bringing the shoulder out of flexion, both ipsilaterally and contralaterally. The tests also use a combination of the patient's effort toward hip extension while simultaneously attempting to increase shoulder flexion toward 180°, both ipsilaterally and contralaterally.

The test is considered positive when one or both muscle groups tests weak when tested simultaneously, but are strong when tested individually. If the groups test weak individually, some other factor is influencing muscle strength and should be found and corrected before the testing procedure continues.

The patient's effort toward hip flexion correlates with the anterior cloacal reflex, while his effort to bring the shoulder out of flexion correlates with the visual righting reflex. The patient's effort toward hip extension correlates with the posterior cloacal reflex, while the effort for additional shoulder flexion toward the 180° mark correlates with the labyrinthine or neck righting reflexes. In other words, the anterior muscles of the shoulder equate with the visual righting reflex which is anterior, and the posterior shoulder muscles equate with the labyrinthine or neck reflex which is posterior. In the pelvic region, the posterior muscles of the hip equate with the posterior cloacal reflex, and the anterior muscles of the hip equate with the anterior cloacal reflex.

Anterior Contralateral Apposition Test

The supine patient flexes his hip to raise his leg from the table slightly; he raises the opposite arm to nearly 160° shoulder flexion. The examiner directs pressure to take the hip toward extension and the arm into further flexion, while the patient attempts to bring the extremities into apposition (11—35).

Anterior Ipsilateral Apposition Test

The supine patient brings his hip into slight flexion to raise his leg from the table, and brings the ipsilateral arm into shoulder flexion nearing 160°. The examiner directs pressure to take the leg toward hip extension and the arm toward full 180° shoulder flexion. The patient tries to bring the ipsilateral leg and arm into apposition (11—36).

Posterior Contralateral Apposition Test

The supine patient duplicates the starting position for the anterior test by bringing his hip into slight flexion, raising his leg from the table, and taking the contralateral shoulder into flexion nearing the 160° position. The examiner directs pressure to the posterior aspect of the thigh to bring the hip into further flexion, while simultaneously directing pressure against the posterior arm to bring it out of flexion. The patient attempts to bring the contralateral arm and leg into posterior apposition or, in other words, the hip toward extension and the arm toward further flexion (11—37).

Posterior Ipsilateral Apposition Test

The supine patient brings his hip into slight flexion, raising his leg from the table, while simultaneously bringing the ipsilateral arm into shoulder flexion nearing 160°. The examiner directs pressure to the posterior thigh and arm to bring the arm and leg into anterior apposition. The patient directs effort toward posterior apposition of the arm and leg or, stated differently, the hip toward extension and the arm toward further flexion (11—38).

Examination and Treatment Procedures

When one or both muscle groups is found to be weak on the above simultaneous tests, the examiner should test each group individually to make certain it tests normal. The cloacal testing procedure is considered positive only when there is weakness of one or both groups when tested simultaneously; they are strong when tested individually.

Examination generally finds two reflex areas involved. Typically they will both be anterior or posterior, and above with below. In other words, the visual righting reflex disturbance will commonly coincide with that of the anterior cloacal reflex, while the labyrinthine or neck righting reflexes will coincide with the posterior cloacal reflex. They can occur ipsilaterally or contralaterally, e.g., the right visual righting reflex equates with either the right or left anterior cloacal reflex. Usually only two positive reflexes are found; occasionally more, and somewhat confusing, patterns may be present. The various patterns can be treated by adapting the techniques described below. There is usually some other factor involved when confusing patterns are found, such as gait mechanism, generalized switching, requirement for PRY technique, etc.

CORRECTION

There are two methods which are applied as cloacal synchronization technique. Both use muscle testing and therapy localization to locate the area for treatment. The methods are described by Goodheart.[19] One method uses gentle manipulative efforts coinciding with the patient's breathing, and apparently deals with the cranial-sacral primary respiratory system. The other method is simple bi-digital reflex point contact.

11—35. Anterior contralateral apposition test.

11—36. Anterior ipsilateral apposition test.

Therapy correlated with respiration requires a general knowledge of the movement of the cranial-pelvic primary respiratory system. The iliac crest of the pelvis moves slightly lateral on inspiration and medial on expiration. The sacral base moves posterior on inspiration and anterior on expiration, while its apex moves anterior on inspiration and posterior on expiration. Clinical evidence shows that the cranium has specific motion with respiration. With respiration the cranial and pelvic movements are coincident and coordinated in their directions. It seems reasonable that failure of the pelvic motion to synchronize with the cranial motion can disturb the integrated function of the equilibrium and centering reflexes. As has been mentioned, normal primary respiratory function of the cranium appears to be necessary for proper function of the visual righting and labyrinthine reflexes. It seems reasonable that pelvic primary respiratory dysfunction could also affect the cloacal reflexes. Need for synchronization of the pelvis with the skull is easily established with applied kinesiology methods described in the literature[19] and in Volume II of this series.

When a respiratory correlation does not appear to be present with the positive combined muscle testing and therapy localization, a reflex contact can be held on the therapy localization points for the various reflexes. Electromagnetic energy patterns about the body are an extremely controversial subject in the healing arts. It becomes somewhat more understandable after studying and working with the meridian system, especially in applied kinesiology. An attempt is often made to explain unusual therapeutic response by electromagnetic fields. Total understanding of these mechanisms must await instrumentation that can qualify and quantify these patterns which sometimes appear to be present. Beardall[5] promotes the hypothesis that there is an electromagnetic energy flow between the reflexes, an important aspect in maintaining normal function of the specific mechanisms. In other words, there is a flow of energy from the anterior cloacal reflex to the visual righting reflex, both ipsilaterally and contralaterally. This is

11—37. Posterior contralateral apposition test.

11—38. Posterior ipsilateral apposition test.

supported by the clinical response obtained by digitally contacting the two reflex points which showed positive therapy localization and equated with the positive muscle testing procedure.

To re-establish synchronization, the positive reflex points should be contacted simultaneously by the examiner. This digital contact is held until the examiner feels synchronized pulsation at both points; this takes approximately twenty seconds in the average patient. The more debilitated the patient, the longer the contact must be maintained before pulsation is felt. Once pulsation is felt, the associated muscle groups should simultaneously test strong, and the positive therapy localization of the reflexes should be abolished.

Treatment and consequent synchronization of these centering and righting reflexes improves body organization. It is specifically indicated when an individual requires repeated applied kinesiology technique to correct switching, or when conditions tend to recur when he runs or walks. This synchronization procedure rarely needs to be repeated.

Economy of Body Use

The doctor interested in improving the patient's total body function often finds it necessary to discuss postural patterns and ways of economically using the body for optimum performance.

When postural strain is present, much greater energy use is required. Improved function uses the body's energies in a more economical way. Many structural stress patterns are present as a result of postural patterns developed early in life; they may even be a result of postural training imparted to a child by adults. Ida Rolf[42] states, "The directive 'stand straight' is among the traditional 'horrors' remembered from childhood." She goes on, "It was not widely recognized that the child whose basic structure was badly organized is required to put out an 'effort' which defeats the goal — that neither physical pleasure nor graceful movement can result from the 'shoulder back, guts in, head up' system."

It appears that two approaches are necessary for economy of action, reduction of stress, and ultimate grace in movement. First, it is necessary to have the structural man capable of functioning in a normal manner without improper facilitation and inhibition of muscles through the nervous system. The fascia and other connective tissues must be functioning normally, and there must be no adverse influence from the chemical or mental side of the triad of health. Second, it is important that the patient himself take responsibility for proper body utilization. Failure to do so will cause recurrence of many of the imbalances that require the physician's and patient's effort, and an economic burden is placed on the patient. It is the physician's responsibility to correctly instruct the patient on proper body economy.

There are many approaches to structural integration, improvement of functional activity of the nervous system, and the elimination of chemical and mental stresses. Applied kinesiology uses many of these in its framework of therapy, and has developed an evaluation system to determine need for some of the therapeutic efforts. This discussion is directed to the second aspect — the patient's responsibility.

Teaching a patient better use of his body can be a major undertaking requiring many sessions. F. Matthias Alexander[1] considered his technique as something to be **taught** to an individual, not **applied** to him. The Alexander technique, a system for improved postural weight bearing and body use, was developed as a result of a problem he himself had with aphasia. Alexander, a voice teacher, lost his ability to speak. Unable to gain help from orthodox treatment, he began observing what took place when he was unable to speak. With a set of mirrors arranged in such a way as to view himself from several directions, he observed that when he could not speak, three motions occurred: he (1) depressed his larynx, (2) lifted his chest, and (3) retroflexed his head. He was unable to suppress these movements until he discovered that a change in the axis of his head on his neck was the controlling factor. The returned speech capability resulting from structural change began his extensive study of body use.

An example of Alexander's influence on body function was given in the presidential address at the British Medical Association in 1926. The president described a patient with flat feet whom he had sent to Alexander. "Please note that Alexander was not interested in the foot. What he did was teach the patient how to use his brain and muscular mechanism, and in the process not only the disabilities associated with the dropped arches disappeared, but THE DROPPED ARCHES ROSE."

The approach Alexander developed is primarily that of body economy. For example, the average individual, when asked to open his mouth, does not drop the mandible, which is most efficient. Rather, he tilts his head back, opening the mouth by raising the maxilla. Goodheart colorfully calls this "opening the head" instead of opening the mouth.

When observing a patient laterally at the plumb line, the line should be just anterior to the lateral ankle malleolus. It travels up through the center of the knee, passing through the center of the femoral head to the center of the glenoid fossa, and ending at the auditory meatus or ear lobe.

A common observation when viewing lateral posture shows how the average individual is imbalanced. The plumb line, lined up just anterior to the lateral malleolus, will project through the occiput, indicating that the head is

too far forward. Although the position of the head with the plumb line indicates an anterior position, further evaluation of the body shows an entire forward lean. When related to the rest of the body, the head is usually too far back.

Patients who fail this alignment test will have many structural strain complaints. There will frequently be tightness in the upper trapezius, general neck tension and lumbar facet syndrome, sometimes with associated radiculitis which may cause symptoms in the lower extremities. Paresthesia in many areas of the body is also common.

Goodheart[21] emphasizes the importance of correct body utilization with the application of four postural criteria to reduce or remove pain patterns. These are from the Alexander technique.

Before applying the technique, obtain an evaluation of the patient's structural strain by having the patient note any tenderness to the examiner's digital pressure in the pectoralis major muscle, posterior cervical muscles, lumbar musculature, and the gluteus maximus. The discomfort to the patient will be right, left, or bilateral, and should be noted by both the patient and physician. With a different posture, there will often be a complete removal of pain, or a significant reduction. Having the patient note the amount of pain in these areas allows for comparison with the new postural pattern.

Step one: rock back at the ankle to place the hips over the heels. Step two: widen the chest. This can best be explained to the patient by placing the hands on the lower borders of the thorax and asking him to breathe in such a way as to spread your hands apart with chest expansion. Step three: allow the shoulders to drop as if they were two wet raincoats hanging on hooks. Step four: put the head forward, which is accomplished by a slight neck motion as if to nod yes. If the head is in the proper position, the mandible opens easily with no observable head movement.

Re-evaluate the pain locations. Usually there will be dramatic relief of the tenderness in the locations previously tested with digital pressure. In some cases there will be little pain reduction. When this happens, there is nearly always an upper cervical involvement preventing the head from going forward in the proper manner. The most common correction required is for a posterior 3rd cervical. Be certain to test the Lovett Brother 3rd lumbar, which will probably also be posterior.

The position described not only reduces the structural strain observed by digital pressure; it also removes the pain from many conditions. Goodheart relates an anecdote about a patient with Morton's neuroma and in considerable pain. When the patient was put in the Alexander position, the pain immediately abated; it returned when she left the position. Similar reduction can be observed in many conditions producing significant pain, such as diaphragmatic hernia, ileocecal valve syndrome, and various structural problems.

The Alexander position can be applied when the patient is either lying down or seated. The patient does not merely think about assuming the position; he actually causes muscular contraction as if he were going into the position while standing. The hips are placed back as if to move over the heels, the thorax widened, shoulders dropped, and head moved forward.

Much information is available for improving our knowledge of body use economy. Barlow[2] thoroughly discusses the Alexander technique and how to apply the principle. Economy of body use is certainly "awareness through movement." This is the title of a book by Feldenkrais,[15] who applies many of the Alexander techniques along with his own methods of becoming aware of body function. These sources should be studied for more thorough knowledge of the subject for patient education.

In educating patients regarding body use, Goodheart[21] uses a handout of posture instructions. The material is reproduced here, with some modifications:

> "Many people ask me about posture. You don't choose your posture, it chooses you. It is my job to treat and adjust any and all departures from normal body position and function.
>
> You can help by following a few simple rules regarding proper body use. Poor use of your body results in many illnesses, perpetuates others, and often prevents full recovery.
>
> At the back of the head and the upper part of the neck there is a vital region of nerve receptors which controls the balance and equilibrium of the body, much as the central exchange controls the telephone system. This area is a 'primary control.' Good postural patterns can become a 'conditioned reflex pattern' that 'brainwashes' for a good purpose, since no one has ever taught you to stand, sit, or walk.
>
> 1. The weight of the body should rest chiefly on the rear of the foot — in other words, on the heels. Put the hips over the heels; the movement starts at the ankle, and the hips should go back as far as possible without altering the balance effected by the position of the feet and without deliberately throwing the upper body forward.
>
> 2. In standing the feet should seek a normal base. The most perfect base is obtained by setting the feet at an angle of about 45° to one another. Defects become exaggerated as this angle decreases; the back hollows and the stomach protrudes.
>
> 3. Breathe naturally to allow the chest to WIDEN at the bottom of the rib cage. In other words, widen the back at the lower ribs, lengthening the spine at the same time.
>
> 4. Let the shoulders hang DOWN like two old wet raincoats hanging from hooks. Do NOT throw them back. You will find that the hanging position brings your shoulders down as far as they will go, which is their proper position.
>
> 5. Dangle both arms. Let your forearm dangle from the elbow, the hand from the wrist, and the fingers from the palm.
>
> 6. Don't forget to allow the lower part of your chest to expand largely sideways. Do not sniff. We live at the bottom of a sea of air; you need not think about your breathing. Think only of expanding and contracting your ribs — let the air in.
>
> 7. Now comes the most important part — the head's position. Let the head be forward and up. This may sound complicated, but just imagine putting your head about a fourth of an inch forward from the position it normally occupies — not down, not back, not up, but forward. Do not crane your neck; simply PUT it slightly ahead of its usual position.

8. The properly coordinated person stands with the back of his hands facing forward, thumbs inward and elbows slightly bent outward. Where the human machinery is concerned, nature does not work in parts but treats everything as a whole; now you must coordinate all these parts by a mental resolve. This allows your body to stand naturally and, as with good mental and moral habits, these new BODY habits can quickly become a part of you, resulting in better health, a better appearance, and better function.

9. Sitting down and standing up require a few more bits of advice. As you begin to sit down, follow your usual inclinations, but press your knees together as you lower yourself into the chair. Reverse the procedure as you arise, pressing the knees slightly outward.

10. For example, sit in an ordinary chair with a straight back. Place your feet lightly on the floor, a few inches apart. Have your calves as near the edge of the seat as possible, but not touching it. Let your back rest against the chair, hands relaxed in your lap. THINK — 'Head forward and up, neck relaxed, spine lengthening, back widening.' The rib widening straightens your back. Now let your hip joints bend your torso forward in the chair. Let your knee joints go forward and away from each other, and bend your hips and ankle joints. The next thing you know, you are on your feet.

11. Sitting down is the reverse of getting up. Give yourself the four orders quoted above: let your knees go forward and come together, and your hips go back with your ankles forward. You will find yourself seated well back in the chair, with your torso bent forward from the hip joints. Keep this position for a second, thinking of those four orders; then order your hip joints to bend, and you will find yourself gracefully seated upright. All good actors and actresses sit down and get up this way; that's why they're such a delight to watch. It is the power of movement that makes a great actress or actor, not just static good looks. This kind of attractiveness of poised and controlled movement makes those who have the secret stand out from others. Use gravity to help — not harm — you.

12. Walking can be a pleasure if it is done properly. Stand in front of the first step of some stairs and place your right foot on the first step with the weight of your body on the left heel, as is normal in standing. As you transfer the weight from the left heel to the left ball of the foot to go upstairs, you must spring forward on the ball of your foot. Walking is like going upstairs, but on the flat. In other words, you spring forward slightly on the ball of your foot while you walk, and your heel lifts. This produces a beautiful movement which is never fatiguing and is literally a treatment for your circulation and your spine."

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Chapter 12

Reflexes

In one way or another, every branch of the healing arts has used reflexes for examination and therapeutic purposes in the treatment of health problems. Many of these approaches have been developed on a clinical basis by individuals who observe consistent patterns of apparent reflex activity from skin, joint, and muscle areas. Various means of stimulation have been used, including mechanical manipulation, thermal, needling (with and without chemical infiltration), electrical, and counter-irritants applied to the skin's surface.

The shelves of bookstores abound with books giving methods for the lay person to relieve headaches, digestive disturbances, body pain, and almost any other conceivable ailment. These books are written by both laymen and doctors, and the techniques appear to give some measure of relief as indicated by the numerous testimonials. Rarely is there an explanation of the mechanism, other than a brief, inconceivable description of some pattern of integration with the nervous system. The scientific community has basically ignored these approaches, and little or no reference to them exists in the literature.

Early in the chiropractic and osteopathic professions, claims were made that mechanical and other forms of stimulation to various body areas influenced the function of structure and the viscera and glands. Very little rationale that was acceptable to the scientific community was given to support the mechanisms by which the clinical effects were brought about. Particularly, there was controversy regarding the claimed somatoautonomic reflexes.

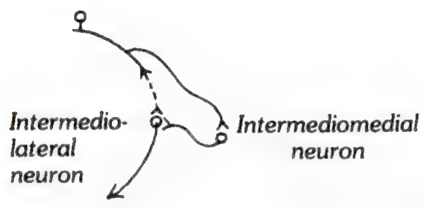
Several studies have recently been done which support some of the claims, though much remains to be learned about the interplay within the nervous system regarding the various reflexes. The reflex descriptions are generally considered as: the body with the body, the body with the viscera, the viscera with the body, and the viscera with the viscera.

As early as 1947 at the annual convention of the American Osteopathic Association, Korr[13] presented a hypothesis of the neurologic mechanism which correlates with many of the clinical findings. He stated that ". . . the lesion is associated with a segment of the spinal cord which is hyper-excitable to all impulses which reach it, and that the hyper-excitability may extend to any neurons having their cell bodies in that segment . . . that the segment is maintained in that state by impulses of endogenous origin entering the corresponding dorsal root. All structures receiving efferent nerve fibers from that segment are therefore potentially exposed to excessive excitation or inhibition." He produced evidence that the neuromuscular spindle cell and Golgi tendon organ are the most important sources of afferent impulses (dysponesis), which produce the changes in the cord associated with the osteopathic lesion.

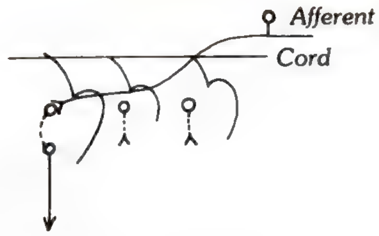
The advent of electrophysiology opened the door to allow better understanding of these mechanisms. Most of the earlier studies were on the somatosomatic reflexes, which are easier to evaluate with electrophysiology because of consistency and ease of recording.

An improved understanding of how the viscera and glands are neurologically associated with the soma has been presented by Coote.[6] Electrophysiologic studies delineate the pathways which are segmental, propriospinal (within the spinal cord but involving more than one segment), and suprasegmental (the afferent volley ascending to the brain stem to activate descending excitatory pathways to the preganglionic neuron to the suprasegmental reflex pathway). Stimulation of a receptor can cause inhibition in one group of sympathetic neurons, while causing excitation in another. This different action does not take place in the spinal animal, indicating supraspinal influence (12—1, 2, 3).

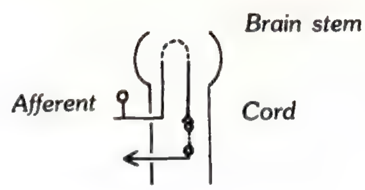
In discussing the influence of the afferent input on the autonomic nervous system, Coote[7] states, "Many parts of the brain are involved in this control, but directly or indirectly they ultimately influence the brain stem and spinal cord wherein lie the cells, the preganglionic motoneurons, whose axons pass out of the central nervous system to synapse with postganglionic neurons in the peripheral ganglia." Supraspinal influence on the reflexes has been demonstrated by comparing the reflex activity in whole, anesthetized animals with spinal animals. Although this influence has been demonstrated, there have not been studies of how the mental processes — including emotions — affect these reflexes. It seems probable that there is emotional influence.



12—1. SEGMENTAL
Afferent impulses from muscle, skin, joints, and viscera by way of a spinal segmental pathway can excite sympathetic preganglionic neurons.



12—2. PROPRIOSPINAL
Afferent impulses can excite adjacent or distant preganglionic neurons. Generally there will be no effect over six segments remote from segmental source.[6]



12—3. SUPRASEGMENTAL
Afferent impulses ascend cord to the brain stem to excite descending pathways to the preganglionic neurons.

Illustrations from Coote.[6]

The supraspinal pathways of reflex activity are probably one of the major areas over which the mental side of the triad of health exerts influence to exaggerate or reduce conditions and symptoms. Whatmore and Kohli[20] present a realistic hypothesis and some of the pathways by which emotional influence through reflex mechanisms can influence health.

Much in applied kinesiology seems to be mediated through neurologic reflexes. Presented here is a brief discussion of some of the activity of body interplay through neurologic reflexes. Those discussed are the somatosomatic, somatovisceral, viscerosomatic, and viscerovisceral. The name of the reflex indicates where the receptor is stimulated to produce the afferent volleys and where the impulses reflex for the effector activity, or the efferent side of the reflex.

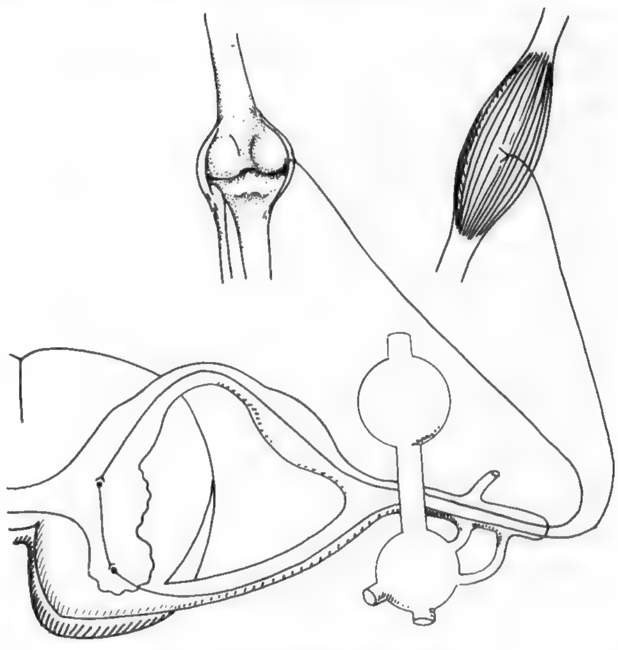
Somatosomatic Reflex

A stimulus of any type which is applied or developed within the external body triggers a reflex which has an effect in the external body. The term "soma" as used here varies from the standard definition, which is, ". . . the body as distinguished from the mind."[8] The term soma as used here refers to the external body, including the extremities, but not the viscera and glands.

Adequate stimulus, as listed by Cole,[5] is variation in temperature, mechanical stress, chemical irritation, and environmental or structural stress. Hagbarth[11] demonstrated reflexes from skin stimulation by electromyography. The muscles of flexion or extension reacted considerably, depending on the localization of the ipsilateral nociceptive skin stimulus. These appeared to be protective mechanisms to move away from the offending object.

Travell and Rinzler[18] clinically described a somatosomatic reflex where the afferent nerve relayed its stimulation to a muscle, causing a hypertonicity and shortening of the muscle. The reflex is clinically returned to normal by dermal application of cold, dry needling, or the injection of substances such as procaine hydrochloride and physiologic saline. The effects and correction of somatosomatic reflexes are more widely recognized and easier to study, and many references can be located.

These reflexes appear to be important in the applied kinesiology approach to proprioceptors and skin reflexes and their relation to muscle strength or weakness. The influence of the subluxation, Golgi tendon organ, and muscle spindle cell on muscle activity, as observed by manual muscle testing, appears to act through this reflex. Skin reflexes, such as those in the foot and hand, and stress receptors also seem to deal through this mechanism for their influence on muscle strength.



12—4. Somatosomatic reflex.

Somatovisceral Reflex

This reflex consists of the receptor located in the soma and its effect on the viscera. Since this reflex functions through the autonomic nervous system, another term that could probably be applied more accurately is somatoautonomic reflex. When the term "viscera" is used here, it implies the inclusion of autonomic controlled structures, including endocrine glands, and the blood vascular and lymph systems, as well as peripheral struc-

tures, such as the sudoriferous glands.

Much controversy has been waged over the years about whether structural problems can influence the viscera. Although there was considerable early evidence that this influence occurs, much was from clinical data, and many of the arguments for somatovisceral reflexes were hypothetical. The early understanding of these activities was from observation of the organs while receptors in different areas of the soma were stimulated. These were primarily observations of the heart and digestive system to nociceptive stimulation of the skin. Blood vascular changes as a result of somatic stimulation were also observed.

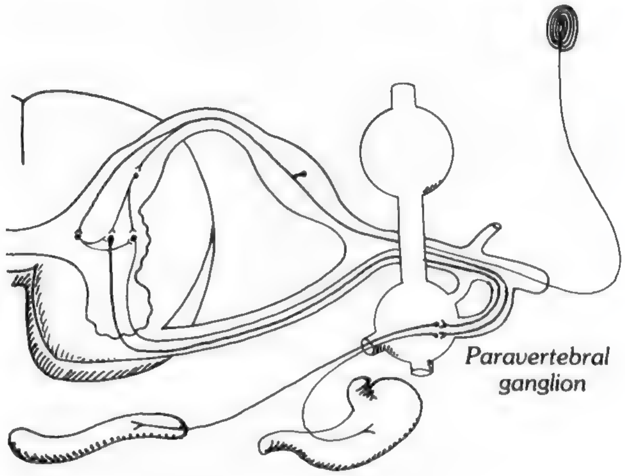
Instruments have been developed to evaluate the apparent effects of the autonomic nervous system on the vasomotor and sudomotor systems. Thermography and other means of temperature measurement have been used, as well as plethysmography for the vasomotor evaluation, while galvanic skin response has been used for the sudomotor activity. In some instances, the measuring equipment has an overlap in evaluating the two functions. For example, sudomotor activity alters the perspiration of the individual, which can then influence the temperature. Triano[19] reviews this type of instrumentation, as well as others used in chiropractic.

The association of somatic lesions with imbalance of the sympathetic nervous system has been demonstrated by the evaluation of vasomotor and sudomotor activity by Korr and co-workers.[14] Koizumi[12] studied intestinal motility by measuring pressure in a balloon inserted into the jejunum. Nociceptive stimuli were applied to the skin of the abdomen, neck, chest, forelimb, and hind limb. The motility study, as well as electrophysiology, revealed reflex from all skin areas. The abdominal skin stimulation was mediated through a spinal cord reflex, while all other areas were supraspinal as indicated by spinal cord section at C2-3. Stimulation of the abdominal area caused the intestine to become completely quiescent, while stimulation of the other area (neck, chest, forelimb, or hind limb) produced augmentation of intestinal motility. There was no interfering influence on these reflexes by surgical section of the parasympathetic vagus in the neck.

Because of the difficulty in making recordings, there has only recently been electrophysiologic study of the somatoautonomic reflexes. Sato[16] reports on his and other studies that have been done on these reflexes in the last ten years. These studies have been made possible by the development of "averaging techniques" for analysis of the sympathetic reflex discharges.

There is strong segmental organization of the somatosympathetic reflex, and also a reflex component of a more generalized character. The reflexes can be divided into three types: those which are (1) at the cord level, (2) within several segments of the cord level, and (3) supraspinal involvement. Thus there are regional and general reactions in sympathetic nerve reactions to somatic afferent supply. Sato describes somatocardiac, somatogastric, and somatovisceral reflexes. The methods used in stimulating these reflexes were either noxious or non-noxious, mechanical, thermal, or electrical cutaneous stimulation.

These methods of recording sympathetic activity have clearly supported the existence of the somatosympathetic reflex. The studies help to understand many of the hypotheses presented in applied kinesiology regarding structural influence on various health problems, especially the ubiquitous functional disturbance.



12—5. Somatovisceral reflex.

Viscerosomatic Reflex

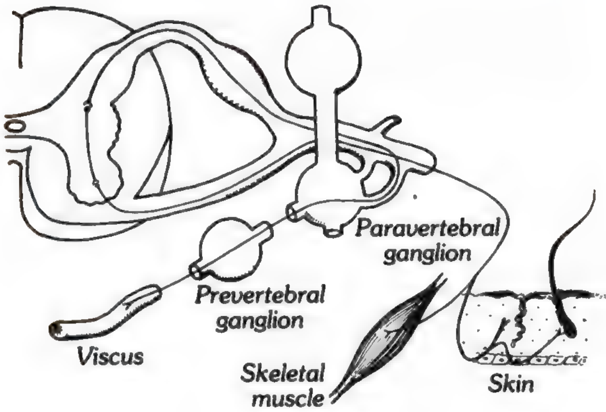
The viscerosomatic reflex has the receptor in the viscus and the effector in the soma. The initiating stimulus is usually from pathology or dysfunction of the viscus. The reaction in the soma can be pain or, apparently, muscle hypo- or hypertonicity or other structural dysfunction.

The example most often referred to is angina pectoris due to cardiac insufficiency. The physician, especially the structurally oriented one, should be ever mindful of this type of reflex because of the possibility of treating structural pain when the basic cause is visceral. For every pain that is apparently structurally oriented, differential diagnosis for the possibility of pathology elsewhere is of great importance.

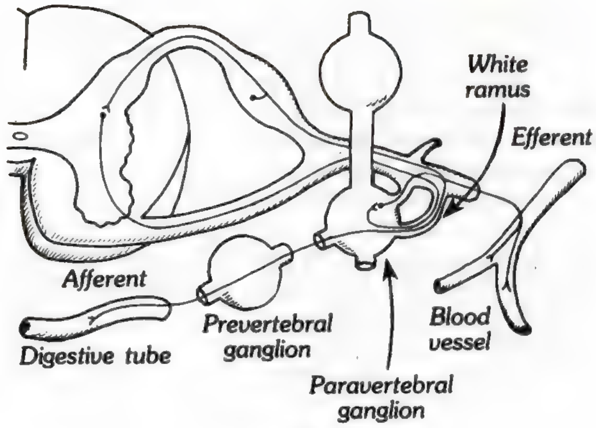
The viscerosomatic reflex may be an important factor relating to the muscle-organ/gland association which has been observed in applied kinesiology. Korr[15] indicates that sympathetic innervation to the skeletal muscle appears to have a direct augmenting effect on the energetics of skeletal muscles. It may be through this reflex mechanism that applied kinesiology observes continued re-involvement of a specific muscle when there is organ or gland dysfunction that has not been corrected (12—6).

Viscerovisceral Reflex

The viscerovisceral reflex consists of a dysfunction in one viscus affecting another organ or gland. The afferent visceral impulses deal with the "internal equilibrium" of the body and the mutual adjustment of the different visceral



12—6. Viscerosomatic reflex.



12—7. Viscerovisceral reflex.

functions.[2] Cole[5] considers that this reflex probably does not exist alone, but rather with a somatic component. He points out that often the autonomic nervous system is considered as an entity, but regardless of its name it does not function autonomously. He continues that the primary response is segmental; however, as in the case of other reflexes, a stimulus of sufficient intensity or duration will result in the activation of other reflexes, even though it might be considered a secondary effect.

Although these reflexes have been discussed primarily as individual entities, they interact with each other; rarely is only one reflex active. Their interactions and diverse distribution seem to give credence to an approach that uses the patient's own body as a laboratory of investigation, as applied kinesiology does. By evaluating the body's own reactions to various stimuli, the vast number of variables can be better taken into account. Thus many possible sources of influence should be considered for improved differential diagnosis.

Foot Reflexology

Foot reflexology has long been used by lay practitioners, some physicians, and laymen for their own personal use. Most of the literature on foot reflexology and the charts accompanying it are published in books for the lay public.[1, 4, 9, 17] In professional literature there are few references to the subject.

There generally has not been an in-depth description of how the foot reflexes influence health in remote areas of the body. Some have talked about foot strain causing "pinching" on the nerve endings which go throughout the body; other possibilities mentioned have been crystals which form in the foot and interfere with normal function, circulatory effects, acupuncture points, and lactic acid congestion.

This author can remember personal thoughts about how ridiculous foot reflexology is, and how his "scientific mind" rejected the possibility of this factor influencing health in any way. It is necessary for the mind to broaden and change to review various concepts and ideas. With this philosophic attitude, it seems reasonable to take another look at any treatment approach which has survived for a prolonged period of time and has been used by many people. The description stating how the approach is beneficial may be found in error as additional knowledge is gained, but the probability that the approach is sometimes effective seems reasonable. That which is ineffective usually dies.

With the understanding of the somatovisceral and somatosomatic reflexes discussed previously in this chapter, foot reflexology becomes a more plausible approach to some of the health problems with which a person becomes involved. But what about the "this for that" type of chart that has been used in foot reflexology? Most of the charts are similar, with specific points of treatment to reflex with

specific areas of the body. Can a specific point treated on the foot be expected to affect a certain organ? Perhaps there is a more generalized effect since most of the tender areas in the foot are treated when a foot reflex treatment is given, even though the patient's symptoms may indicate more concentrated treatment in one area.

Foot reflexes were introduced into applied kinesiology by Goodheart[10] as a result of his observation of their influence on muscle strength. When the foot reflex for a certain organ was stimulated, the associated muscle often strengthened. Therapy localization was being developed about this time in applied kinesiology, and these points were found to have positive therapy localization if they strengthened a weak associated muscle.

The treatment advocated for the foot reflex is to digitally press on the reflex in a linear direction to find what stimulation causes the associated muscle to strengthen. Pressing on the reflex in this direction several times generally causes the muscle to gain strength and maintain it. If a weak associated muscle cannot be found, a positive reflex can be located by therapy localization which causes a strong associated muscle to weaken on manual muscle testing. The reflex can also be located by using a linear challenge which, when positive, will also cause a previously strong indicator muscle to weaken. If both an associated weak muscle and a strong indicator muscle are evaluated, the same reflex challenge will strengthen the weak muscle and weaken the previously strong muscle. To repeat, the therapeutic pressure is applied in the direction which makes a strong indicator muscle weaken, or a weak associated muscle strengthen on challenge, with the phase of respiration which abolishes the positive challenge.

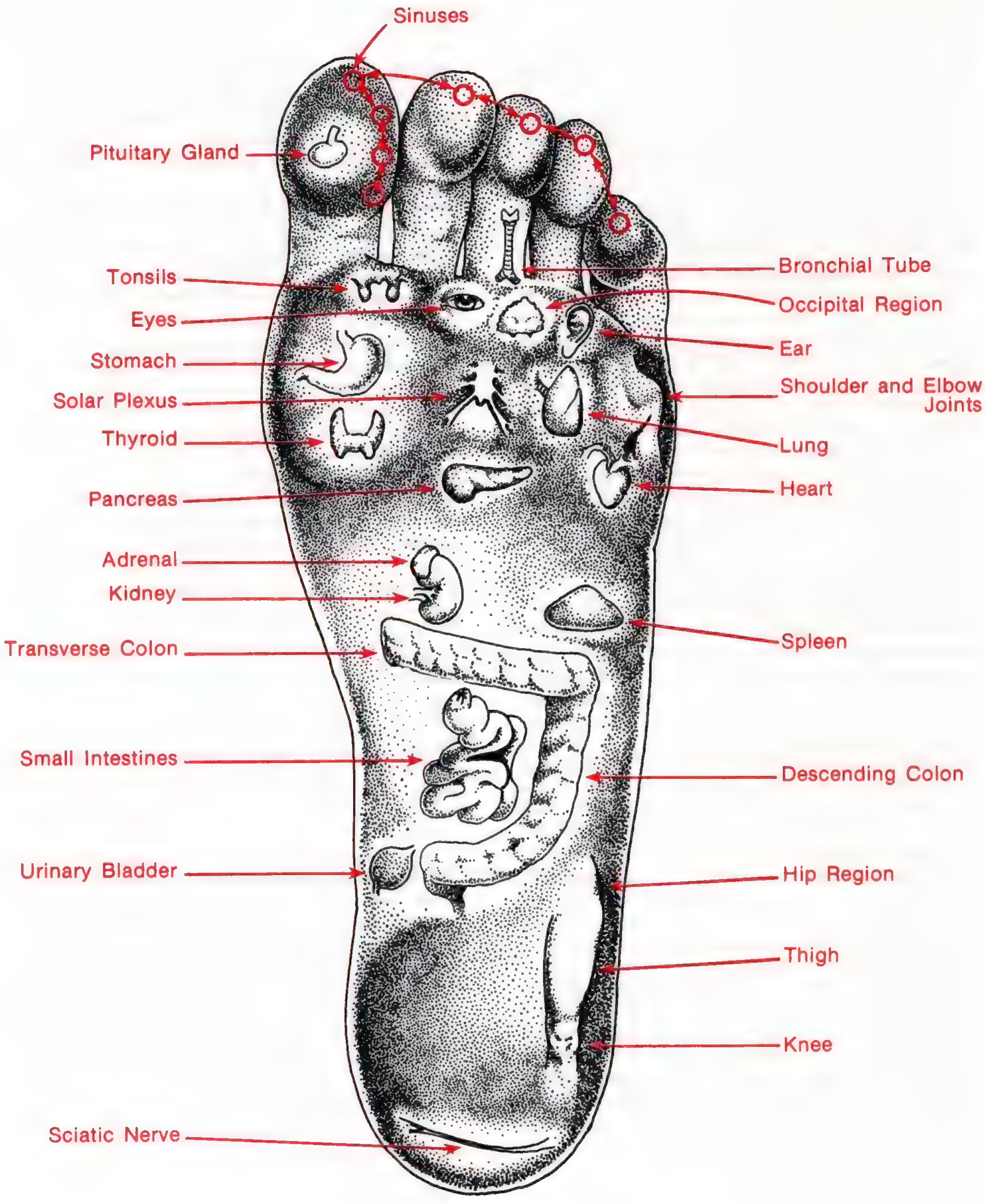
Let us return to our question of whether a specific area in the foot can be consistently relied on to affect a certain organ or gland. Possibly a more rational understanding of these reflexes can be developed from applied kinesiology clinical observations. It will be generally observed that the foot reflexology charts list the sinus area over the distal ends of the tendons of the flexor digitorum longus and flexor hallucis longus. Some charts show the points over the distal phalanx at the insertion of the tendons, while others note them as being slightly more proximal.

An interesting correlation can be observed in most normally functioning individuals. To attempt this experiment, the subject must have neck flexors strong in the clear. These muscles are associated with the sinuses in applied kinesiology. Test the muscles with the patient in a supine position to determine that they are strong. Have an assistant apply constant digital stimulation over the flexor hallucis longus and flexor digitorum longus while the neck flexors are re-tested. In most cases, the neck flexors will weaken. It may be necessary to change the point of stimulation slightly to observe a positive reaction. Rarely will stimulation of any other area on the foot cause the same reaction, nor will the stimulation over the toes cause other muscles to weaken, with the possible exception of other flexor muscles or closely associated muscles.

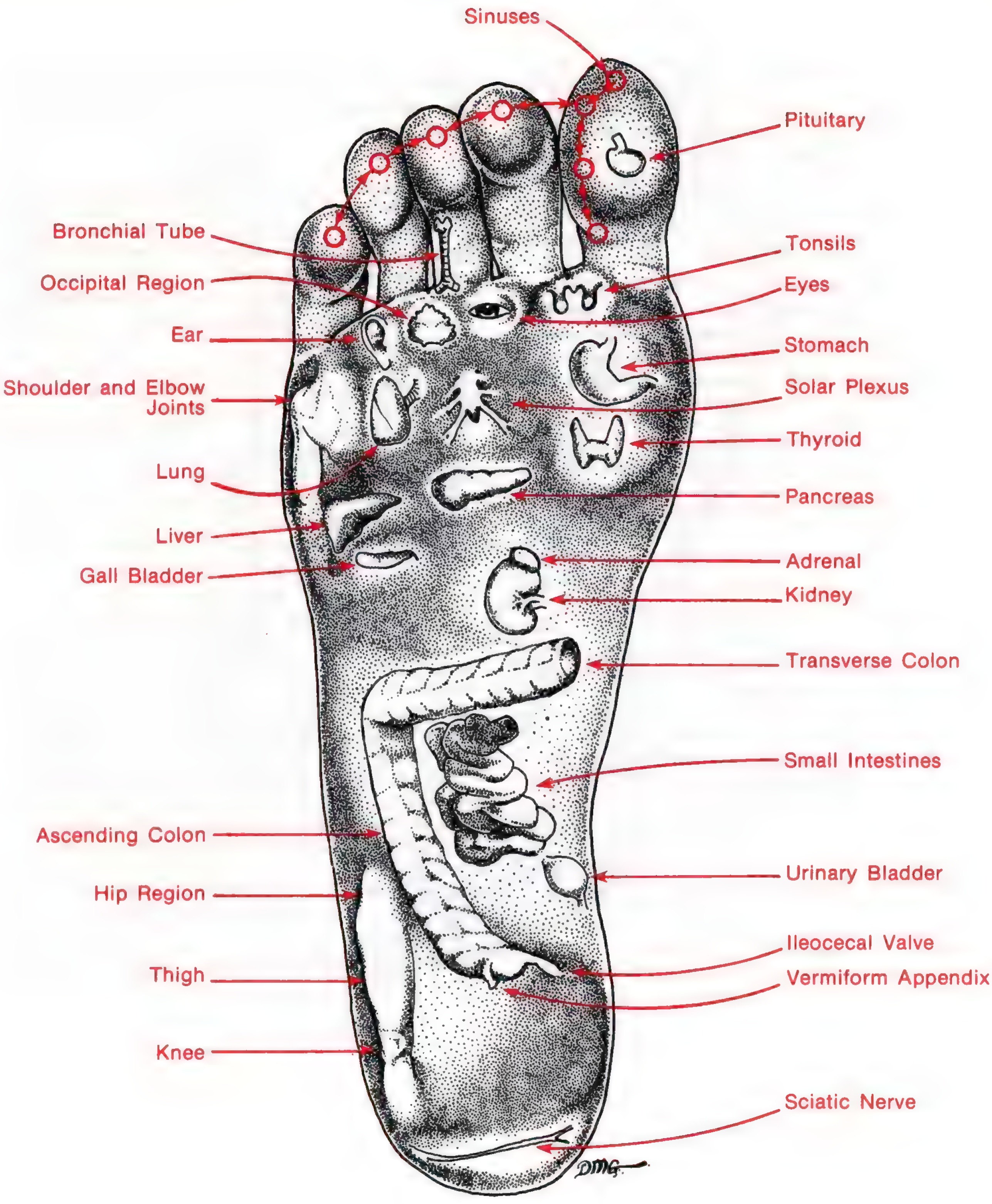
In applied kinesiology, there is a clinical correlation of neck flexor dysfunction with sinus problems. This seems to indicate that there is an activation of a somatovisceral reflex from stimulation of nerve endings in the so-called sinus reflex area of the foot. The correlation of foot reflexes which developed in one school of thought and muscle-organ association which developed in another shows a pattern which requires electrophysiologic studies of the reflex connections. Whether the reflex has intero- or exteroceptors with location in the skin, tendon, or joint capsule is unknown. Manipulative efforts that remove evidence of active reflexes indicate that the receptors are proprioceptive, located in the tendons or joint capsules. There are many more illustrations of foot reflexes apparently influencing specific areas of the body.

Correction of foot subluxations, muscular imbalance, and general structural strain appears to influence the foot reflexes. Observation of the combined association of reflex, subluxation, and muscle-organ involvement seems to tie additional evidence of the interplay together. Early in applied kinesiology, Dr. Edward Doss, Sr., of Stuttgart, Arkansas, related clinically that a lateral cuboid subluxation was frequently associated with an ipsilaterally weak tensor fascia lata muscle. Therapy localization, challenge, and correction of this subluxation all seem to support this conclusion. It is interesting that the tensor fascia lata is associated in AK with the colon, and traversing the plantar surface of the foot at the level of the cuboid is the reflex associated by most foot reflexologists with the colon. An attempt to challenge the skin only in this reflex area will frequently cause a strengthening of the tensor fascia lata, as will a challenge of the cuboid. Manipulation to correct the cuboid subluxation eliminates the positive skin reflex.

The foot reflexes appear to be associated on a somatosomatic and somatovisceral basis; structural strain and subluxations are nearly always associated with the positive reflex. Failure to correct the structural involvement usually causes the reflex to quickly return, even though it has been treated effectively as far as the reflex challenge and respiratory assist go. Foot reflexology, it appears, can sometimes effectively correct structural strain in a foot on a lasting basis, but the results are random. The best procedure is to use therapy localization, challenge, and other approaches available in applied kinesiology to obtain a more specific and consistently lasting correction. (The foot is discussed thoroughly in Volume IV.)



12—8. Left foot.



12—9. Right foot.

Hand Reflexes

There appear to be areas on the hands which reflex to other areas of the soma and the viscera. The possible neurologic mechanism of these reflexes has been discussed in the early portion of this chapter. Vivian Bates, D.C., introduced these reflexes to Goodheart.[10] Carter[3] has written a book on hand reflexology for the layman. Some of her reflexes correlate with those in applied kinesiology; however, most do not. As with foot reflexology, a "hand treatment" is usually generalized, with specific attention given to some points.

The reflexes, as charted here, appear to correlate with the muscle-organ/gland association which has been presented in applied kinesiology. There may be some variance in the location of the reflex, but usually they are found in the location listed. Active reflexes are clinically seen most often in individuals who work hard with their hands, such as mechanics, carpenters, laborers, etc. This indicates that physical stress to the hands may set up the reflex activity. They are not observed as often as foot reflexes, probably because the foot is generally subjected to greater stress. The hand reflex should also be considered in athletes who use their hands as an integral part of a sport, such as occurs when gripping a racket or club, or catching a ball.

The activity being performed by the patient when symptoms develop is sometimes a clue for a hand reflex. If a carpenter develops a somatic or visceral problem while actively pounding nails, the hand should be evaluated as well as the elbow, shoulder, and other structures involved in the activity. The same basic principle applies to athletes who have difficulty performing an action, such as serving in tennis. When the hand is involved, it is possible — and even probable — that the symptomatic correlation is remote from the hand. Specific hand activities stimulating active reflexes can cause dysfunction in a leg or the trunk.

An active reflex will frequently correlate with the muscle associated, and possibly with the organ or gland indicated. When there is an active hand reflex, it is often found that the remote associated muscle will be weak in the clear; however, this is not always the case.

Therapy Localization

The active hand reflex will therapy localize by the usual procedures. If a muscle is weak in the clear and associated with the reflex, it will strengthen upon therapy localizing the point. Therapy localization to an active hand reflex point will cause a previously strong indicator muscle to weaken.

Challenge

Challenge is a mechanical method of locating an active hand reflex point. It also gives information regarding the correction of the involvement. The hand reflex point will generally challenge in one linear direction; this may vary somewhat from the chart provided. Positive challenge will cause an associated weak muscle to temporarily strengthen, and will cause a previously strong indicator muscle to temporarily weaken.

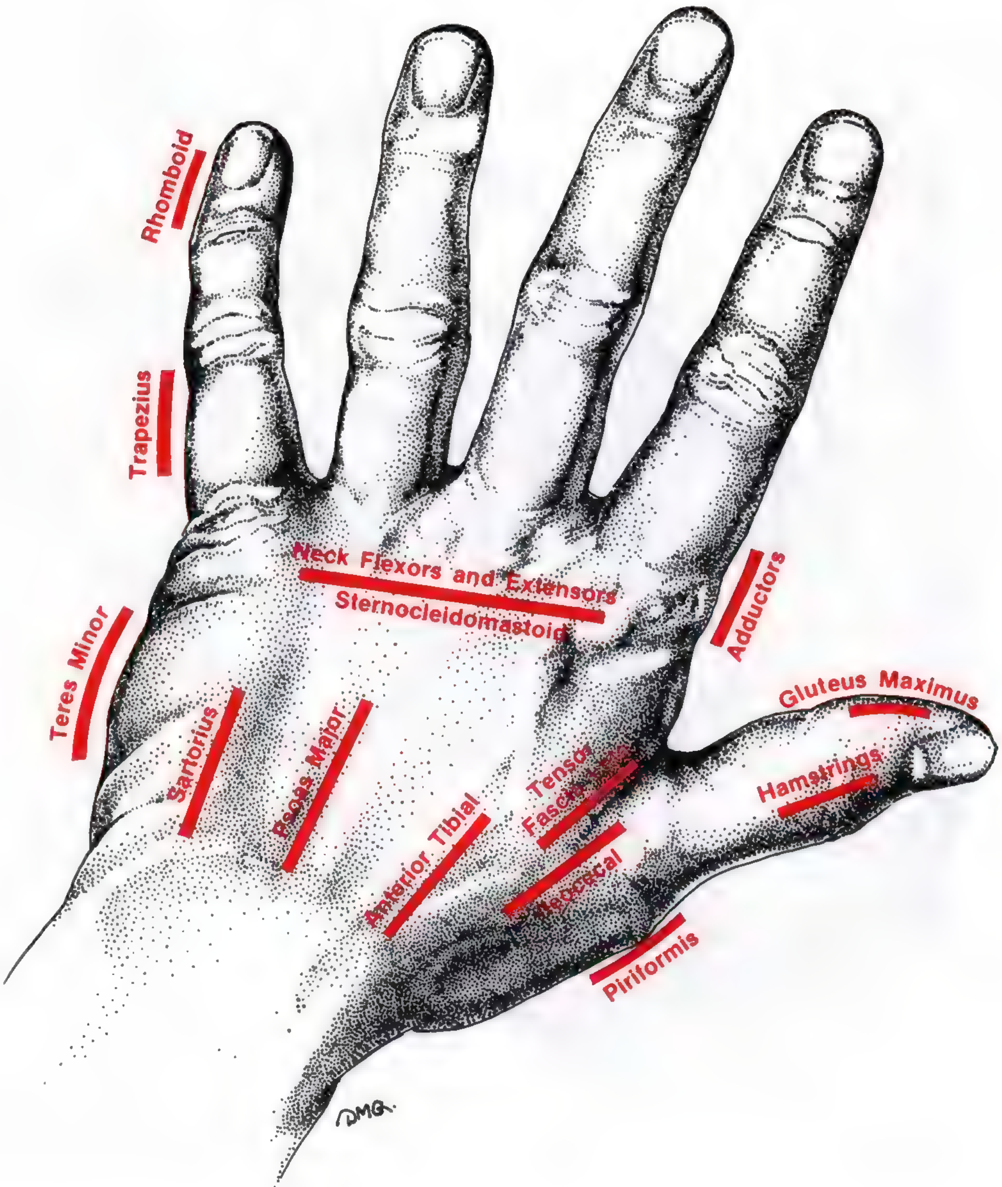
When a positive challenge is found, it is correlated with respiratory assistance. This provides information regarding how to treat the area on a reflex basis.

To determine the direction and phase of respiration for correction, use a previously strong muscle as an indicator. Find the challenge that causes the greatest weakening in the indicator muscle; then have the patient take a deep inhalation and determine if that phase of respiration abolishes the challenge. If it does not, repeat the process with the patient exhaling.

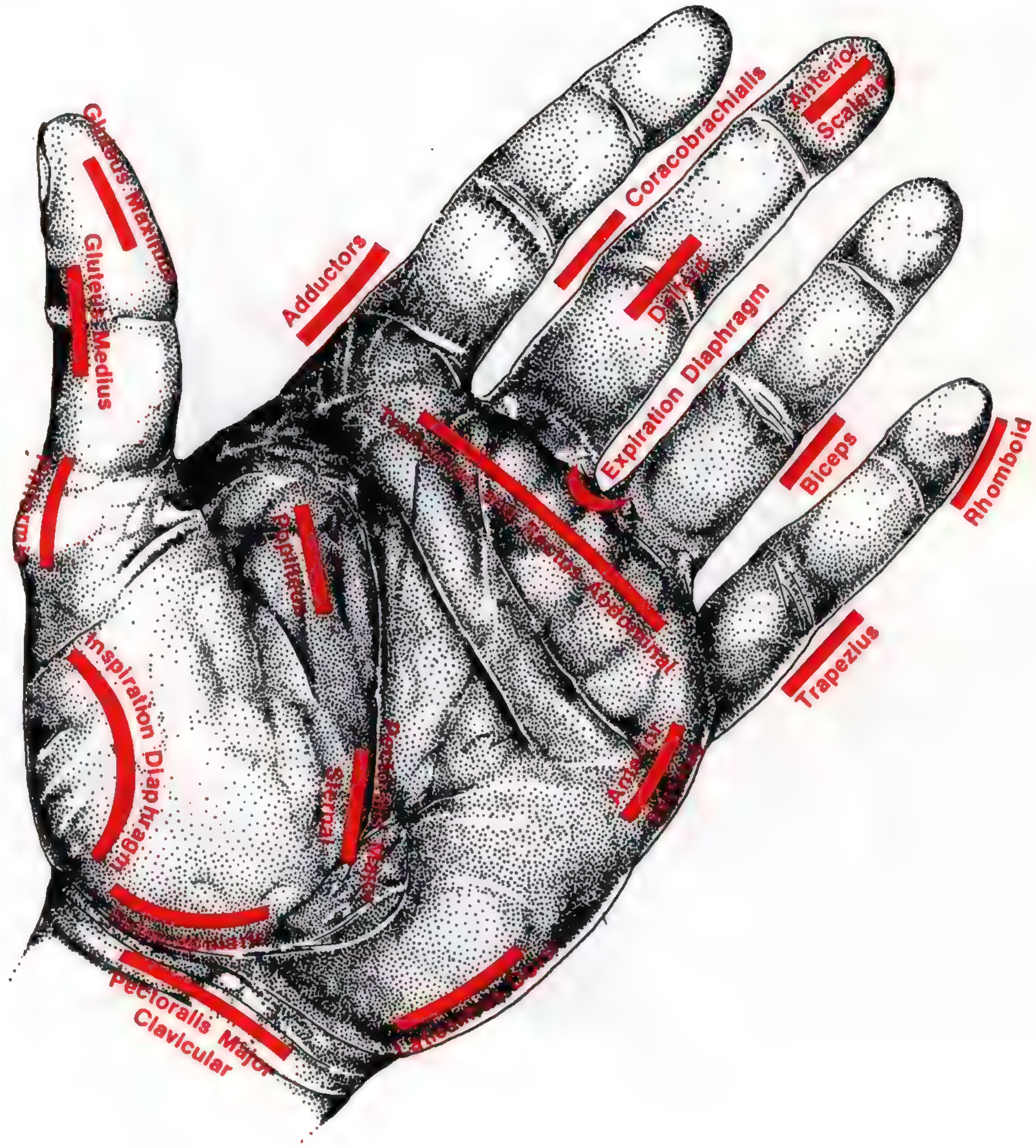
Correction

The positive reflex can be corrected by digitally pressing on the tissues in the direction of the positive challenge while the patient takes the phase of respiration that abolished the challenge. This is done with approximately one to seven kilograms of pressure and repeated four to six times, or whatever number is necessary to abolish the positive therapy localization and challenge. This reflex-type treatment will usually abolish the challenge and therapy localization; however, there is generally a structural problem of some nature associated with the involvement.

The hand should be evaluated for subluxations, involvement of intrinsic muscles, and also for distant muscles whose tendons insert into the hand area. If there is an involvement with any of these structures, the positive hand reflex will probably return as soon as the hand is stressed again. Evaluation of the hand for subluxations and other involvements is discussed in Volume IV.



12—10. Dorsal surface.



12—11. Palmar surface.

Stress Receptors

What appear to be skin reflexes located about the cranium are known as "stress receptors" in applied kinesiology. Goodheart[10] reported that Jack Elvidge, D.C., of Spokane, Washington, correlated some Riddler "cranial stress centers" with manual muscle testing. These reflexes immediately aroused Goodheart's interest because he had previously associated a point on the skull for hamstring involvement; it correlated with Elvidge's. The hamstring reflex location was observed in a patient who had struck her head in a fall, and developed hypertonicity of the hamstring muscles as a result. Other methods, including those of the proprioceptors known in applied kinesiology at that time, were administered, but they were unsuccessful in removing the hypertonicity. Digital stimulation of the skin at the injured point on the skull dramatically relieved the hypertonicity; it did not return. The unique factor of this reflex was that stimulation in one direction relieved the cramp, and opposite stimulation caused it to return.

Up to this point in applied kinesiology, reflexes were used only to strengthen a weak muscle. This was the first observation of a hypertonic muscle being returned to normal.

Further evaluation of the cranial stress receptors revealed that these reflexes have an ability to influence hyper- or hypotonic muscles. Hypertonic muscles which are almost at the point of cramping, or are actually spastic, can be returned to normal. A muscle which is weak on manual muscle testing can also be returned to normal.

There also appears to be an influence on the organs and glands through a somatovisceral reflex. Each reflex is associated with a muscle. The organ or gland influenced is that which is associated with the muscle.

A stress receptor may be active for no apparent reason, but there is usually history of trauma to the area, which may be fractures, contusions, lacerations, etc. The history may be recent or chronic.

Therapy Localization

Active stress receptors can be located with therapy localization. The usual approaches to therapy localization are adhered to, in that a muscle which is weak as a result of an active stress receptor will strengthen; a muscle which is hypertonic will weaken when the point is therapy localized. General therapy localization — that is, a broad hand contact over a major area of the skull — can generally be used as a screening process for an active stress receptor. Either a previously strong indicator muscle can be tested for weakening, or the involved muscle can be tested for change.

Challenge

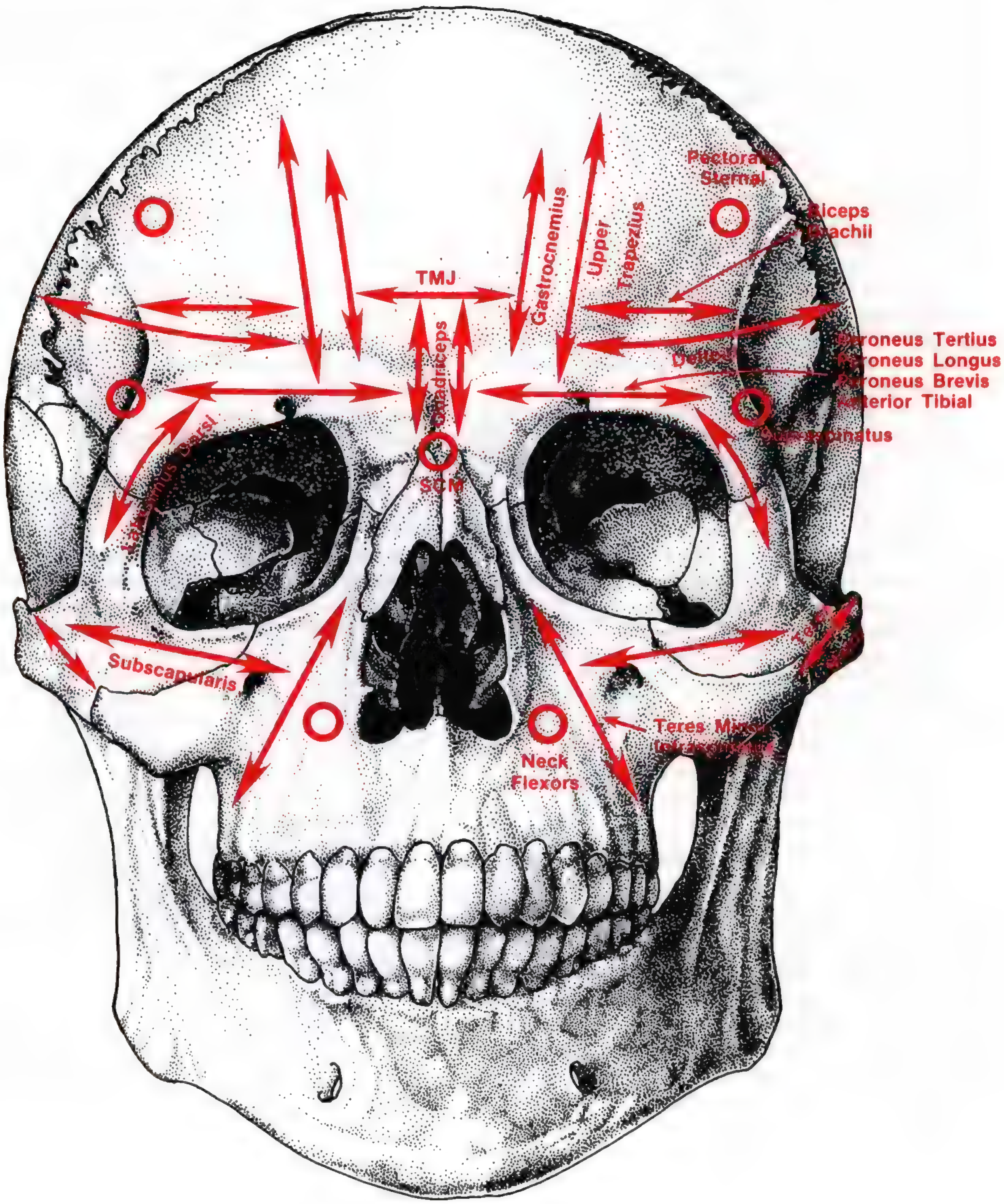
Stress receptors react to linear stimulation. Some appear to be considerably longer than others; these typically react to stimulation in only two directions. On the chart, these receptors are indicated by lines with an arrowhead on each end. Other stress receptors are more localized and also react to linear stimulation, but do so in any direction. These are indicated on the chart by a small circle.

One stress receptor that appears to be different from others is related to the temporal bulge cranial fault and bilateral pectoralis major (clavicular division) weakness. This stress receptor is located bilaterally, mostly parallel to the sagittal suture. Rather than a single linear contact, it seems to require a double contact on the ends of the stress receptor with compression provided toward the center of the reflex area.

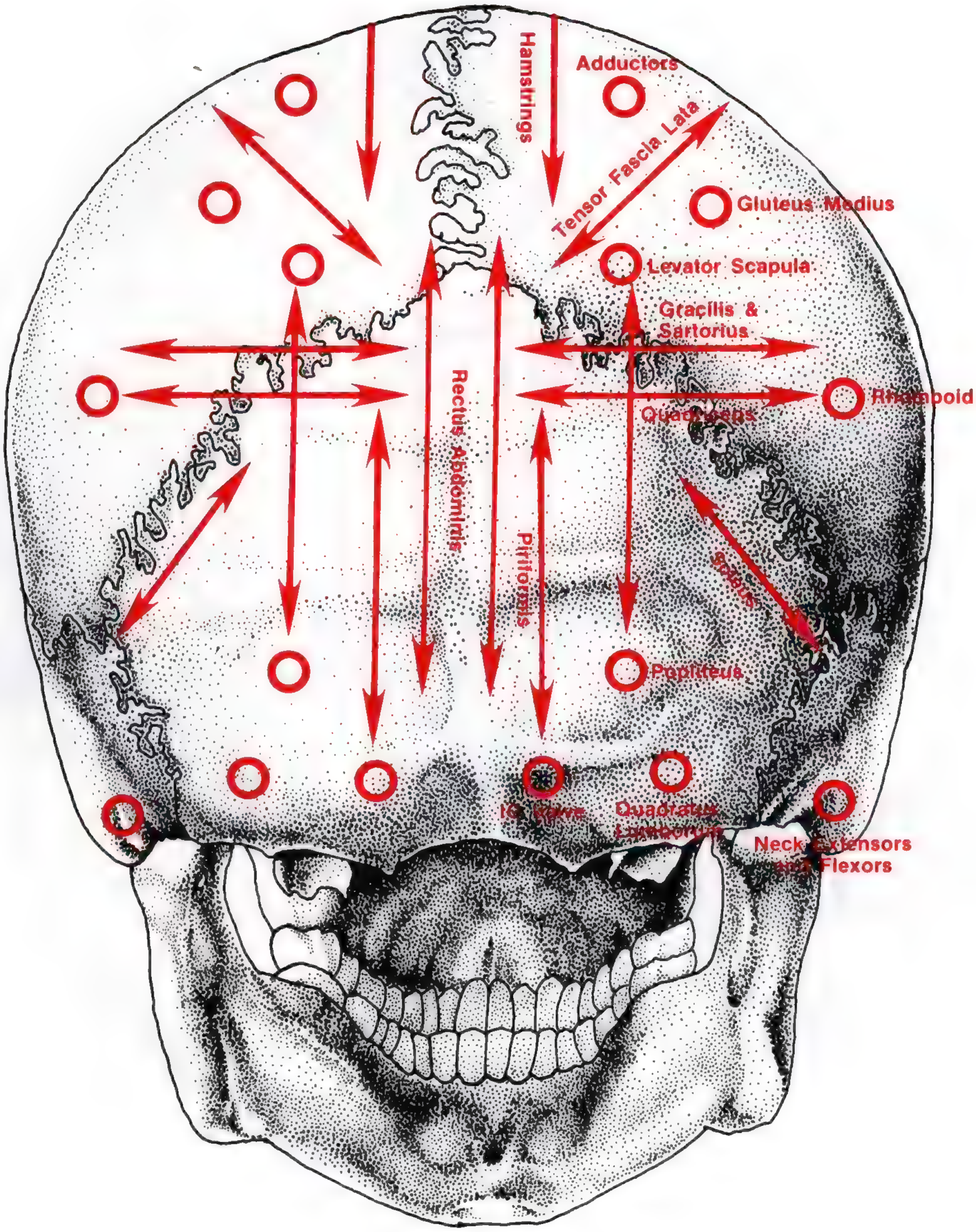
The challenge of a stress receptor is for diagnostic purposes to determine the direction of therapeutic stimulation. The stress receptor is challenged in various vectors until the desired reaction is observed in the associated muscle. The muscle, if hypertonic, will weaken; if weak, it will strengthen.

The active stress receptor appears to have a respiratory quality which should be included during the therapeutic digital pressure. To determine the phase of respiration which correlates with an active stress receptor, first determine the positive challenge; while the challenge effect is still positive on the muscle, have the patient take and hold a phase of respiration to determine if it abolishes the positive challenge. For example, if a muscle associated with an active stress receptor is hypertonic, the correct challenge will cause the muscle to weaken. While the muscle is still weak from the challenge, have the patient take a deep breath in and re-test the muscle. If the muscle immediately becomes strong, this is the phase of respiration which is used during treatment. If an active stress receptor is causing a muscle to be weak, the opposite approach is used. The challenge is administered until the direction is found which causes the weak muscle to strengthen, and then the phase of respiration which causes the muscle to weaken again is found. The stress receptor is treated digitally in the direction which caused the muscle to strengthen, on the phase of respiration which abolished the challenge.

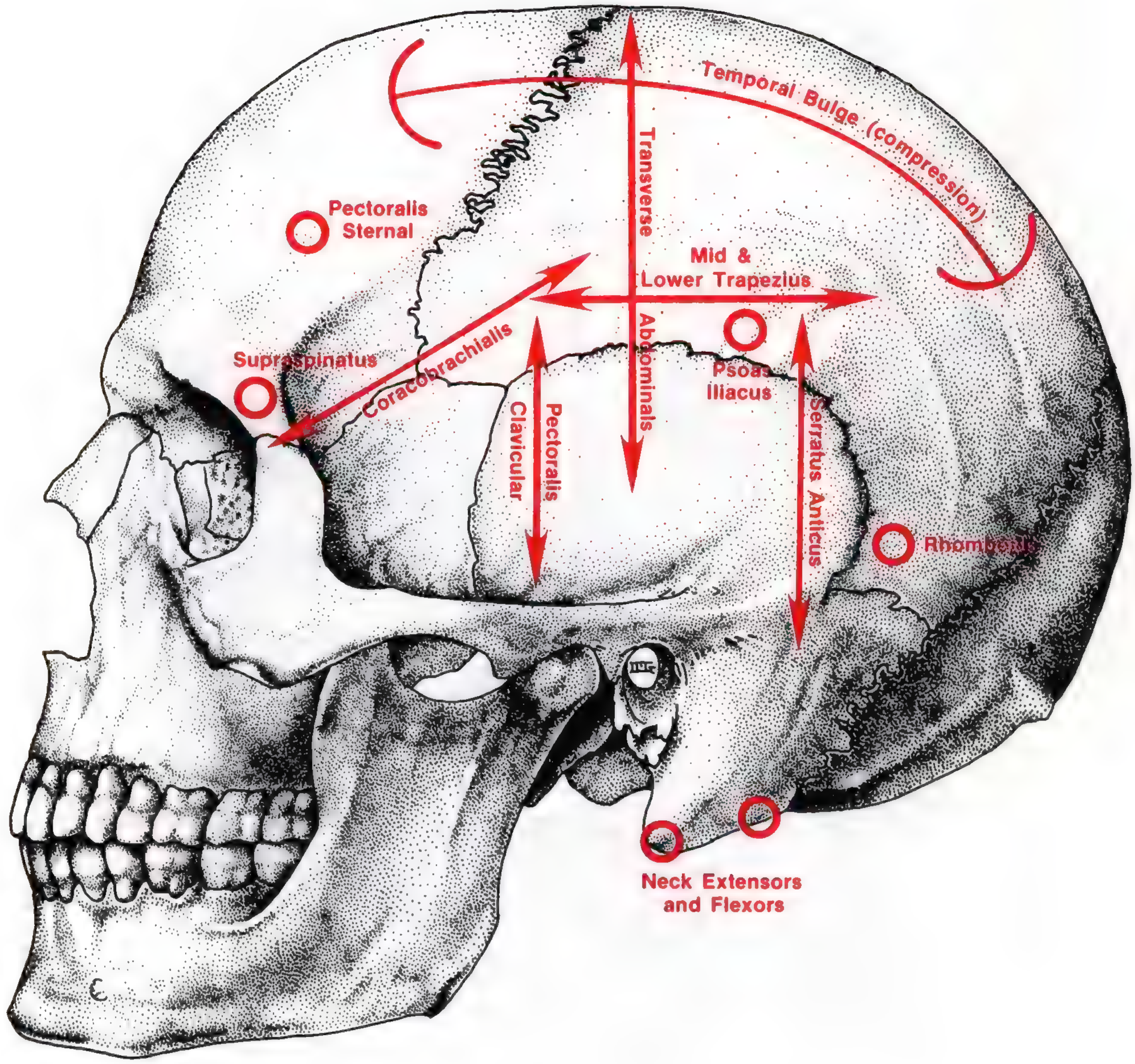
Treatment pressure is one to seven kilograms applied linearly over the skin area of the reflex during the full phase of respiration that abolished the challenge. Usually the digital pressure is repeated four or five times, which should abolish the indications of the positive reflex.



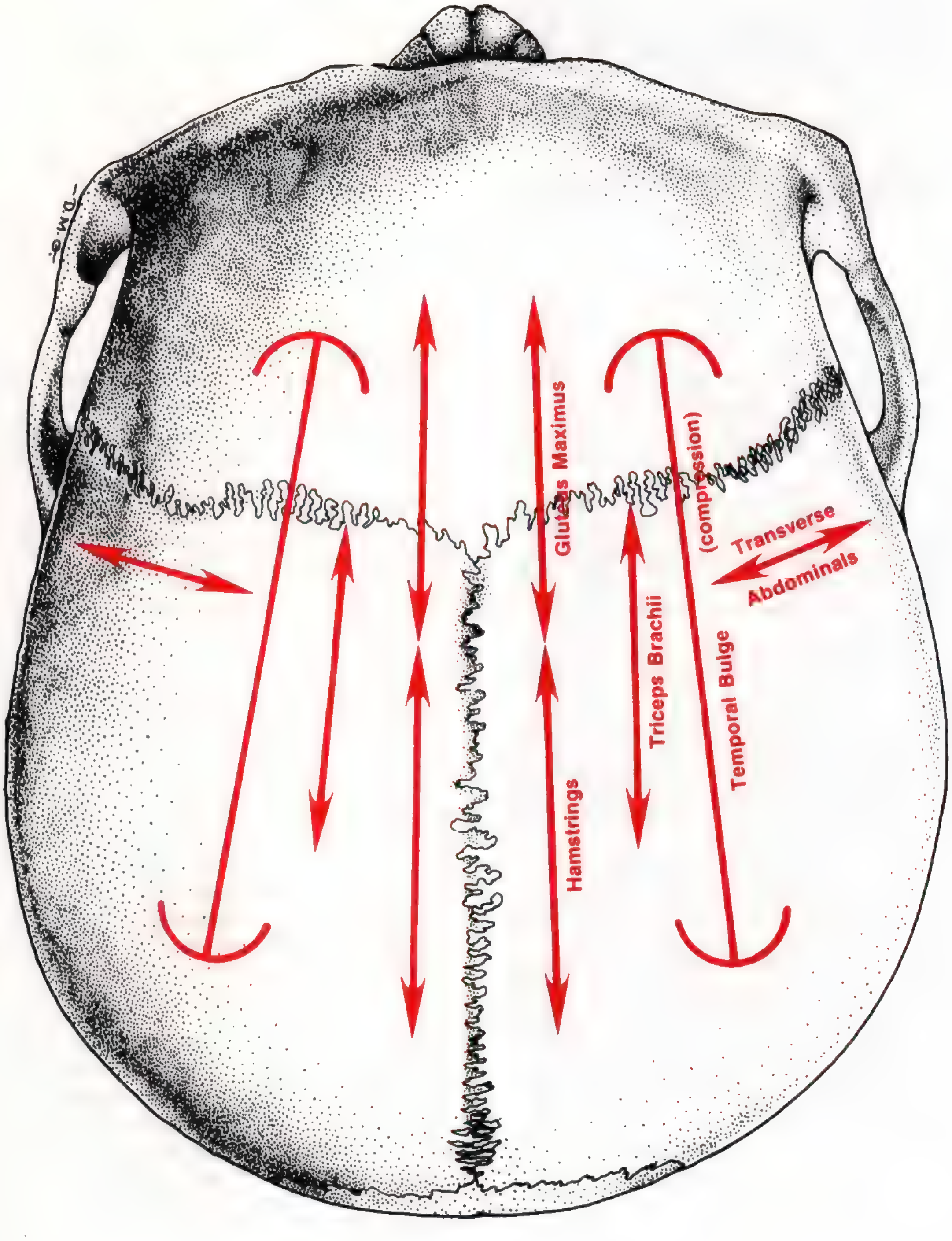
12—12. Anterior view.



12—13. Posterior view.



12—14. Lateral view.



12—15. Superior view.

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Chapter 13

Lymphatic System

The lymphatic system drains the interstitial spaces of fluid and large particulate matter. Activity of the lymphatic system is absolutely necessary in maintaining capillary function. Without its maintenance of the interstitial spaces, death would occur within a relatively short time.

Drinker[5] proposed ". . . that the capillaries practically universally leak protein; that this protein does not re-enter the blood vessels unless delivered by the lymphatic system; that the filtrate from the blood capillaries to the tissue spaces contains water, salts, and sugars in concentrations found in blood, together with serum globulin, serum albumin, and fibrinogen in low concentrations, lower probably than that of tissue fluid or lymph; that water and salts are re-absorbed by blood vessels and protein enters the lymphatics together with water and salts in the concentrations existing in the tissue fluid at the moment of lymphatic entrance." This hypothesis opposed the then current belief that healthy capillaries did not leak large molecules such as protein. It is now known that the blood capillaries do indeed leak large molecules such as protein and fat. Only a small amount of large molecules can return to the blood capillary from the interstitial spaces. They must be removed from the area by the lymphatic system. The loss of protein to the interstitial spaces and removal by the lymphatic system is a dynamic process necessary to maintain the amount of fluid in the interstitial area, which is important for several reasons.

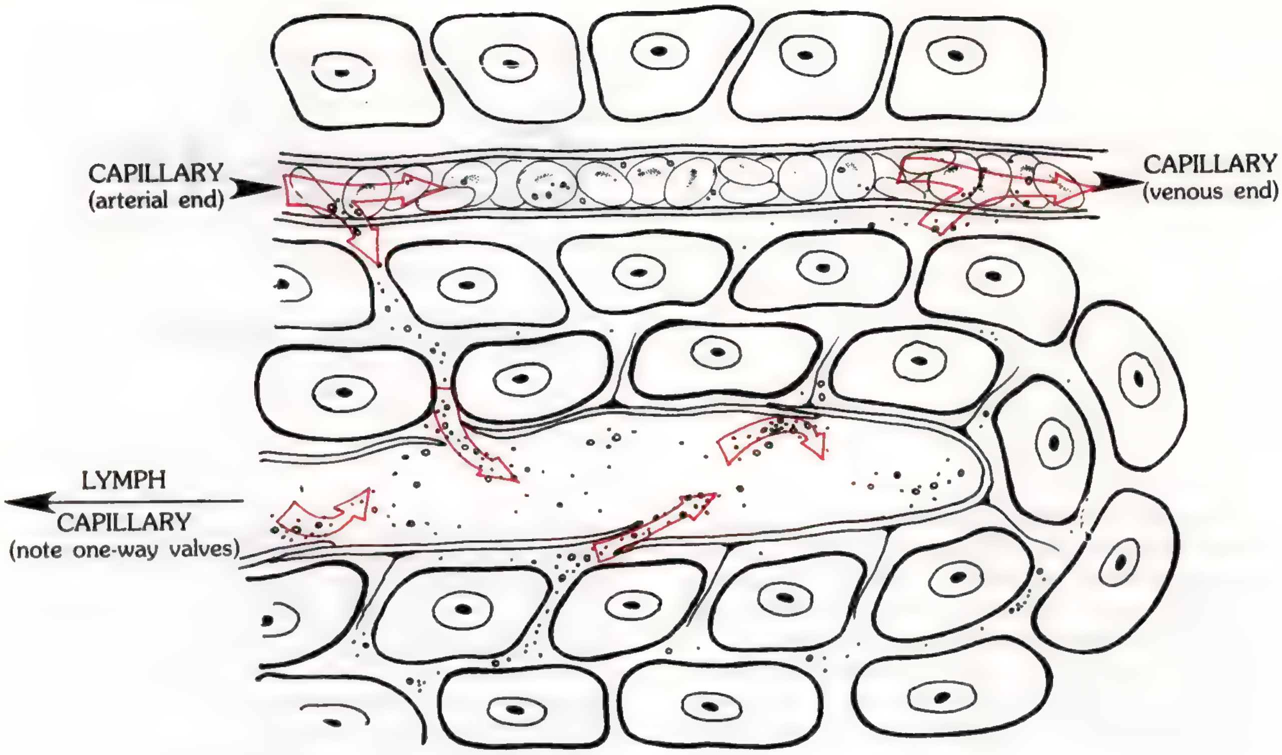
The general anatomy of the lymphatic system consists of an extensive network of lymph capillaries which drain excess fluid directly from the interstitial spaces in all areas of the body, with few exceptions. Even these have fluid flow ultimately reaching the lymphatic system, with the exception of the brain, which is served by cerebrospinal fluid. From the lymph capillaries, lymph flows to larger vessels, which become more organized. These vessels contain one-way valves to maintain the lymph flow toward the terminal collecting areas into the venous system, thus returning the lymph to the blood. There are collections of lymph nodes along the larger lymph vessels which filter bacteria and other foreign matter that may be in the lymph. They are also sites for production of lymphocytes and antibodies, thus serving as an important protective mechanism for the body.

The cisterna chyli is the dilated area receiving the two lumbar lymphatic trunks, as well as several contributories from the abdominal area. The thoracic duct arises from the cisterna chyli, which receives several more contributories and empties into the junction of the left subclavian and internal jugular veins. The thoracic duct drains most of the body, returning the lymph to the blood. Lymph from the right side of the neck and head, and from the right arm and parts of the right thorax is drained by the right lymphatic duct, which then enters at the junction of the right subclavian and internal jugular veins.

The lymphatic system has been difficult to study by dissection. The smaller vessels are fragile, creating some difficulty in dissection and also in infusing the closed system with traceable material. The lymphatic system also has considerable anatomical variation among specimens.

The lymphatic capillaries are the collecting areas for lymphatic fluid. The capillaries are close-ended. Capillary walls are composed of single cell layers which are effective one-way valves allowing passage of fluid and large molecules into the capillary; however, they do not allow passage out. Further along in the lymphatic ducts are more one-way valves maintaining the fluid movement toward the termination of the system. This makes up a significant part of the "lymphatic pump."[11] The interstitial spaces normally maintain a negative pressure in the amount of —6mm. Hg. Fluid is moved from this negative pressure into the lymph capillary by a suction created in the lymph capillary. This is accomplished by a squeezing action on the capillaries by body movement which propels lymph away from the central collecting area. Thus a small amount of interstitial fluid enters the lymph capillary and again is trapped by the one-way valve. Another method by which fluid moves from the negative pressure of the interstitial area is compression of the tissue area via muscle contraction and other body movements to temporarily raise the interstitial pressure to a positive value. This causes fluid movement into the lymphatics, which is then removed as motion compresses the lymphatic capillary and vessels further along to propel the lymph away from the collecting area (13—1).

Lymph propulsion has been primarily discussed in the literature as the mechanical action described above. Guyton[11] states that motion pictures have been taken of



13—1. Protein and fat leave the blood capillary, moving into the interstitial spaces. These large molecules cannot return to the blood capillary and move into the lymph capillary through the one-way valves. The lymph, with the protein and fat, is returned to the blood by way of the thoracic duct and right lymphatic duct. Redrawn from Mayerson[13] and Guyton.[11]

exposed lymph vessels, both in animals and in man, which show that any time a lymph vessel becomes stretched with fluid, the smooth muscle in the wall of the vessel automatically contracts. He goes on to state that ". . . even the lymphatic capillary has its own intricate pumping mechanism. Though the lymphatic capillary does not have any smooth muscle cells in its wall, the lymphatic capillary endothelial cells do contain contractile fibers called myoendothelial fibers." It is possible that this muscular action of the lymphatic system correlates with the neurolymphatic reflex which has been clinically successful and is supported by applied kinesiology observations. It is the next section to be discussed under the lymphatic system.

Yoffey and Courtice[21] list six extrinsic factors for the movement of lymph. They are: (1) muscular activity, (2) passive movement, (3) pulsation of blood vessels, (4) motility of the intestinal tract, (5) venous pressure, and (6) gravity.

Muscular activity has already been discussed as skeletal muscles compressing the lymphatic vessel, which forces the lymph in the one direction allowed by the valves. The height of this increase will depend on the degree of muscle contraction and on the anatomical disposition of the fascial planes. Also included in the muscular activity are respiratory movements, which give an active propulsion of lymph from the lower to the upper mediastinum. Also, any increased abdominal pressures, such as coughing, straining, or lifting, will have a powerful effect on propelling lymph along the thoracic duct. Respiratory movement is an important intrinsic factor in the flow of lymph along the main lymph channels from the abdominal and thoracic cavities.

The influence of respiratory activity and movement of the thoracic cage appears to be important in a technique to improve lymph drainage; it is called "retrograde lymphatic technique." In obtaining optimum lymph flow, it is necessary not only to correct fixations or subluxations of the ribs and thoracic spine, but to regain normal function of the diaphragm and muscles of accessory respiration if they are not functioning adequately.

Passive movement, such as the limbs being moved, squeezes the lymph vessels to propel lymph. The passive movement of lymph has primarily been used in massage therapy to stimulate lymph flow. The cardinal rule in massage — always work toward the heart — applies to the one-way valves of the lymph system as well as those of the veins.

Pulsation of blood vessels affects lymph flow by its massaging effect on nearby lymph vessels. The cisterna chyli particularly obtains mechanical motion from the pulsations of the aorta.

Motility of the intestinal tract is particularly important in lymphatic flow when there is fat to be absorbed by the lactiles.

Increased venous pressure reduces lymph flow because the lymph enters the blood stream in the veins of the base of the neck.

Gravity reduces the flow of lymph when an individual is in the upright position. Under normal circumstances, lymphatic drainage should increase when an individual is put in a retrograde (head lower) position. This will be considered further under "Retrograde Lymphatic Technique."

The role of the lymphatic system in returning protein to the blood stream is extremely important. Mayerson[13] states that ". . . in the course of a day, 50% or more of the total amount of protein circulating in the blood is lost from the capillaries and is returned to the blood stream by the lymphatic system." This movement of protein from the capillaries into the interstitial area and then into the lymphatic system is important in maintaining interstitial fluid levels. Because of the high protein concentration in the blood stream, the protein which leaks from the capillaries cannot efficiently return to the blood stream. It must return by way of the lymph capillary system. As protein accumulates in the interstitial tissue spaces, the tissue colloid osmotic pressure increases. This causes a decrease in the reabsorption of fluid by the blood capillaries, thereby promoting increased interstitial fluid. The increased fluid is moved into the lymph capillary as described above, carrying the protein with it.

Failure of protein removal causes edema, increasing the interstitial space and moving the cells further away from the capillary, disturbing their cellular nutrition. Best and Taylor[2] state that ". . . the lymph flow helps in maintaining tissues. The ligation of lymph vessels in the heart may give rise to myocardial degeneration; in the kidneys it may accelerate the development of hydronephrosis when the ureters are tied; and in the liver it hastens the degenerative changes that follow bile duct ligation."

When lymphatic drainage is poor, the interstitial space is increased. This causes the cell to be at a greater distance from its capillary. It is essential that the distance be maintained at a minimum; otherwise nutritive damage to the cells can result.[11] It seems reasonable that reduction of lymphatic flow can cause functional tissue problems, short of a diseased state. This is the usual type of lymphatic disturbance with which applied kinesiology apparently deals.

Excess fluid concentration is not clinically observable until the level is 30% above normal.[11] This is probably why there often appears to be a lymphatic drainage disturbance on applied kinesiology examination, but no edema is observed in the area.

Once edema has developed, the tissue stretches and creates greater permeability. This stretching takes place in a relatively short period and becomes more established with chronicity. Reduction of edema in a condition where the tissue has become more permeable is difficult to maintain since it is easier for the edema to return because of the greater permeability. Chronic edematous conditions may require persistence in maintaining improved lymphatic drainage until the tissues can return to normal consistency.

General Examination

In identifying the possibility of lymphatic congestion, we must deal with the usual obvious approaches in physical diagnosis as well as more subtle indications of possible functional disturbance. The more obvious indications are lymph node swelling in the groin, popliteal, axillary, elbow, and cervical regions. The supraclavicular area may show edema on either the right or left as a result of restriction, causing poor drainage of the right lymphatic duct or the thoracic duct respectively.

"Pitting" edema is seen when pressure is applied digitally, moving the interstitial fluid to another area. When pressure is released a pit remains, which will diminish in 5 to 30 seconds. If there is considerable edema and the fluid fails to move when pressure is applied, it is called "brawny" edema, from coagulation of the fluid in the tissues. This is caused by an infection or trauma to the area. There can sometimes appear to be interstitial edema when actually the fluid build-up is within the cells and not interstitial. In this case, there is no pitting edema. The subject is discussed more thoroughly in Volume V under "Relative Hypoadrenia."

More subtle indications of lymphatic drainage problems are observed by palpation of the tissues. Typically, there is tenderness of the tissue when lymphatic drainage is poor. There appears to be "tension" in the tissues; the fascial planes seem to adhere to each other, rather than move smoothly.

The type of primary condition the patient is experiencing is frequently the clue that the lymphatic system may be at fault. Conditions such as tonsilitis, sinusitis, ear and upper respiratory infections, as well as common colds, are often from poor drainage of the lymphatic system. Any trauma which will not heal, chronically swollen articulations, and generalized joint pain are somatic indications of poor lymphatic drainage. Lymphatic drainage problems are nearly always involved with such specific conditions as colitis and Crohn's disease.

There are three methods of improving lymphatic function in applied kinesiology at this time. One is apparently based on a neurologic reflex to the smooth muscle and myoendothelial fibers of the lymphatic system, and is called the neurolymphatic reflex. The other two are mechanical in nature, designated retrograde lymphatic technique and mechanical stimulation of lymph flow.

NEUROLYMPHATIC REFLEX

In the 1930s, Frank Chapman, an osteopath, developed a system of reflexes for the improvement of lymphatic drainage. He correlated these reflexes with specific organs and glands and with different types of health problems. Apparently Chapman[3] used the reflexes to help diagnose a condition, and then massaged the reflex which he had found on an empiric basis. His research appears to have been for the purpose of correlating palpatory findings with a patient's condition.

This author has been unable to locate Frank Chapman's original writings. There are periodic references to Chapman's reflexes in the literature, primarily that of the osteopathic profession. There is little technical reference to the mode of action of these reflexes; most comments relate to the empiric use of the reflex in different conditions.[1, 12]

On the basis of dissection, Small[17] hypothesized pathways by which Chapman's reflex could influence the lymphatic system by reflexing into the autonomic nervous system. He found what appeared to be the receptors of Chapman's reflexes in lymphoid tissue located in the intercostal space between the anterior and posterior layers of the anterior intercostal fascia. He also equated the medial and lateral posterior cutaneous receptors as contributing to the reflex. He went on to speculate that the lymph nodes of the organs are affected through the sympathetic fibers.

With more recent knowledge, it seems plausible that the lymph system could be influenced through sympathetic pathways to the smooth muscle in the wall of the vessels and the myoendothelial fibers of the lymphatic capillary. Neurologic disturbance in the control of the contractile tissue of the lymphatic system has not been demonstrated; the basis for use of Chapman's reflexes is clinical. The diagnostic techniques in applied kinesiology have given clinical support to effects of the reflexes, revealing clinical reproducibility of their influence on muscle function.

In 1965 Goodheart[6] observed that specific muscles, found weak on manual muscle testing, would strengthen dramatically when a certain Chapman's reflex was stimulated by massage. This was the beginning of correlating various therapeutic measures, with muscle testing being the diagnostic tool. These reflexes have become known as "neurolymphatic reflexes" in applied kinesiology because of the apparent neurologic influence over lymphatic drainage.

As various muscle weaknesses were associated with the different reflexes, it became obvious that there was a parallel of Chapman's findings regarding organ or gland dysfunction associated with specific reflex areas, and the applied kinesiology muscle association with various organs and glands. The reflex Chapman had associated with the stomach influenced the pectoralis major (clavicular division), which Goodheart had associated with the stomach. When the muscle was found weak on manual muscle testing, the organ or gland would not always be involved; however, when an organ or gland was involved, there would often be weakness of an associated muscle and a corresponding active neurolymphatic reflex. The interrelationship between the neurolymphatic reflex, muscle weakness, and the association with an organ or gland was certainly not infallible; however, it seemed to have enough consistency to encourage further investigation.

With the increase of knowledge in applied kinesiology, one can observe that there is nearly always an involvement of an associated muscle when there is organ or gland dysfunction. The involvement, however, may be subclinical and specialized techniques may be necessary to reveal it.

The neurolymphatic reflexes are located on the anterior and posterior aspects of the body, primarily in the intercostal spaces adjacent to the sternum and along the spinal column. Most muscles have neurolymphatic reflexes anterior and posterior bilaterally. Some reflex points are for a specific muscle, while others affect numerous muscles.

There are specific conditions which should alert the physician to a possible need for neurolymphatic stimulation. Any condition which puts an extra load on the lymphatic system — such as toxic problems associated with the bowel, congestion of the lungs, bronchii, and sinuses — is one which nearly always requires neurolymphatic reflex activity. Even though these conditions may require a considerable amount of neurolymphatic activity, this does not mean that neurolymphatic reflex dysfunction is the primary cause of the condition. For example, if the patient has colitis with a primary cause of hypoadrenia, dietary indiscretion, and neurologic imbalance, stimulation of the neurolymphatic reflex will give temporary relief; however, the active neurolymphatic reflex will return and the patient will be in the same condition as before if the primary cause is not corrected. Chapman[3] recognized this. "My special plea is on behalf of the lymphatic aspects of disease which I regard of paramount importance whether they originated in bony lesions, infections, toxins, or other cause."

Examination

The neurolymphatic reflex is both diagnostic and therapeutic. Chapman[3] related, "Once you become thoroughly familiar with all the reflexes . . . you will know without a moment's hesitation what the patient's symptoms are, even before he tells you." Although this may be somewhat exaggerated, there is an important diagnostic value in the reflexes. The active neurolymphatic reflex is tender to digital touch, sometimes exquisitely so. It is generally more tender on the anterior than on the posterior. The location can be determined by palpation, and is characteristically different from the surrounding tissue. Additional information regarding prognosis can be obtained with experience in using these reflexes, since their characteristics change with chronicity. Chapman[3] remarked, "According to the amount of soreness of the anterior contractions, you may judge the extent of the lymphatic blocking — and even to the extent and seriousness of the inflammation of the area involved."

On the anterior, the acute neurolymphatic reflex has a puffy, doughy, swollen feeling of a homogenous nature, about three centimeters in diameter. As chronicity sets in, the homogenous nature changes to one of concentrations,

slightly more compact tissue about one to two centimeters in diameter and feeling somewhat like soft lima beans. With greater chronicity, the compactness is accentuated and the size of the palpable nodules becomes smaller and much harder, somewhat like granules of sand or small BB's within the tissue. The posterior reflexes feel much the same as the acute anterior reflexes, but they appear to change little with chronicity.

Experience in working with neurolymphatic reflexes enables the examiner to locate the treatment area accurately by palpation. During treatment, the characteristic feeling of the reflex indicates the time the reflex has been active and gives some indication of pressure needed. Chronic involvement requires longer, harder manipulation. The patient's reaction to the tenderness should also indicate whether treatment is being applied to the appropriate location and help regulate the pressure used.

Therapy Localization

The method used to determine if the neurolymphatic reflex treatment is appropriate for a weak muscle is to therapy localize over the reflex and determine if the muscle strengthens. If so, stimulation to the neurolymphatic reflex is appropriate.

The neurolymphatic reflex can also be evaluated by therapy localizing it and testing a previously strong indicator muscle for weakening. If the reflex is active, the indicator muscle will weaken. The usual precaution — that therapy localization only reveals that something is involved, **not what** — should be observed. It is possible to think that a posterior neurolymphatic reflex is being therapy localized when it is actually a vertebral subluxation or a meridian point known as an associated point, both of which are in the same location. The same is true on the anterior, where therapy localization could actually be to a rib misalignment, etc.

Sometimes clinical evidence that a neurolymphatic reflex point is active is shown by palpation, tenderness, and symptoms, yet the muscle(s) associated with the reflex is not weak. If the neurolymphatic reflex is active although the associated muscles are strong, it is considered "subclinically weak." The neurolymphatic reflex is probably influencing the muscle; however, other backup systems of the body are actively maintaining its apparent normal status on manual muscle testing. The mechanisms could be within the meridian or nervous system. If this apparent subclinical weakness is present, it is rapidly revealed by testing the muscle while the patient therapy localizes to the neurolymphatic reflex. If the neurolymphatic reflex is involved, the associated muscle which previously tested strong will now test weak. This weakening will generally be observed in all muscles, the same as described previously in the use of an indicator muscle. The muscle(s) associated in applied kinesiology with the reflex will generally show the greatest weakening, and will sometimes weaken when other general indicator muscles do not.

A muscle associated with the active neurolymphatic reflex will generally strengthen with only a few seconds of digital reflex manipulation. The fact that the muscle now tests strong on manual muscle testing does not necessarily indicate that the reflex has been adequately treated. It may now be similar to the subclinical weakness described above.

Occasionally, therapy localization for a muscle association will not show an active reflex point. Another method that gives clinical indication that a neurolymphatic reflex needs stimulation is having the patient therapy localize the neurolymphatic reflex while another previously positive examination procedure is being done. This is done when there is clinical evidence there may be lymphatic involvement with the condition, yet the neurolymphatic reflex does not test positive by the usual means. This procedure is of value when a correction does not hold and the doctor is looking for additional factors which will be of help. An example is when a subluxation shows positive challenge, but does not challenge when the neurolymphatic reflex associated with the area is therapy localized. A knee may be repeatedly subluxated, yet the muscles associated with the knee test normal; foot and pelvic problems have been ruled out, and there is no pathology in the area. First, challenge the knee to determine exactly which vector is positive. Repeat the challenge, but simultaneously have the patient therapy localize to neurolymphatic reflexes which may be associated with the articulation. These would include the reflexes for the sartorius, tensor fascia lata, hamstrings, and popliteus, among others. While the neurolymphatic reflex is being therapy localized, challenge the articulation again to determine if the previously positive challenge is now negative. If so, there is indication that the neurolymphatic reflex being therapy localized is involved in the clinical problem. Specific evaluation of the various articulations is covered in Volume IV. In this case, although the neurolymphatic reflex may not test positive with the usual approaches, it should be stimulated; this often gives clinical results as evidenced by more permanent correction of the subluxation.

Therapy localization, in conjunction with other testing procedures, can be carried out in many different ways. Clinical evidence of lymphatic involvement is observed in repeated testing of the same muscle, but the neurolymphatic reflex does not usually appear to be involved without the dual testing method. Whenever therapy localization to the neurolymphatic reflex cancels a previously positive indicator, the reflex may be involved. To confirm the association, use the other diagnostic criteria of tenderness, palpation, and association information.

Correction

Treatment of the neurolymphatic reflex (NL) is accomplished with a rotatory massage, with the physician using the palmar surface of his fingertips. Early in the development of applied kinesiology, the treatment pressure for stimulating the NL was described as the amount of pressure an individual could stand on his eyeball. With further experience, it has been found that the amount of pressure has an inverse relation to the length of time stimulation will be required for effective elimination of the active reflex. Generally, the amount of pressure used for treatment is harder than that of the early days in AK, and the treatment usually lasts for approximately 15 seconds. Chronically active neurolymphatic reflexes require longer stimulation for effective elimination. Lighter digital pressure is neces-

sary when the reflex is exquisitely tender; this, of course, would then require longer stimulation. It is sometimes necessary to stimulate the reflex with less pressure for longer periods of time if chronicity is exceptionally great. The heavier, shorter stimulation usually leaves the patient sore in the area.

The same basic approach used to find a subclinical muscle weakness is used to determine the length of treatment necessary for the neurolymphatic reflex. As long as stimulation is necessary, the muscle will weaken when the associated neurolymphatic reflex is therapy localized. When adequate stimulation has been accomplished, the muscle will be strong in the clear and will not weaken when the neurolymphatic reflex is therapy localized.

As mentioned, approximately 15 seconds of stimulation on an active neurolymphatic reflex point is generally adequate. Chronicity requires longer treatment. In some cases prolonged stimulation is necessary, perhaps as long as five minutes. These, of course, are the exceptions; however, adequate treatment to the reflex is necessary to prevent its recurrence.

It is possible to overstimulate a neurolymphatic reflex. If an increase in muscle strength is observed and treatment is continued to the reflex, the muscle may dramatically weaken. If this occurs, the reflex has probably been overstimulated and the neurologic mechanism has become fatigued or sedated. If this happens, the reflex can be restimulated after a few minutes' rest.

When therapy localization is not evident over the neurolymphatic reflex, there is a problem in determining the exact length of time for treatment. The common approach is to stimulate the reflex until the acute tenderness has been diminished or removed.

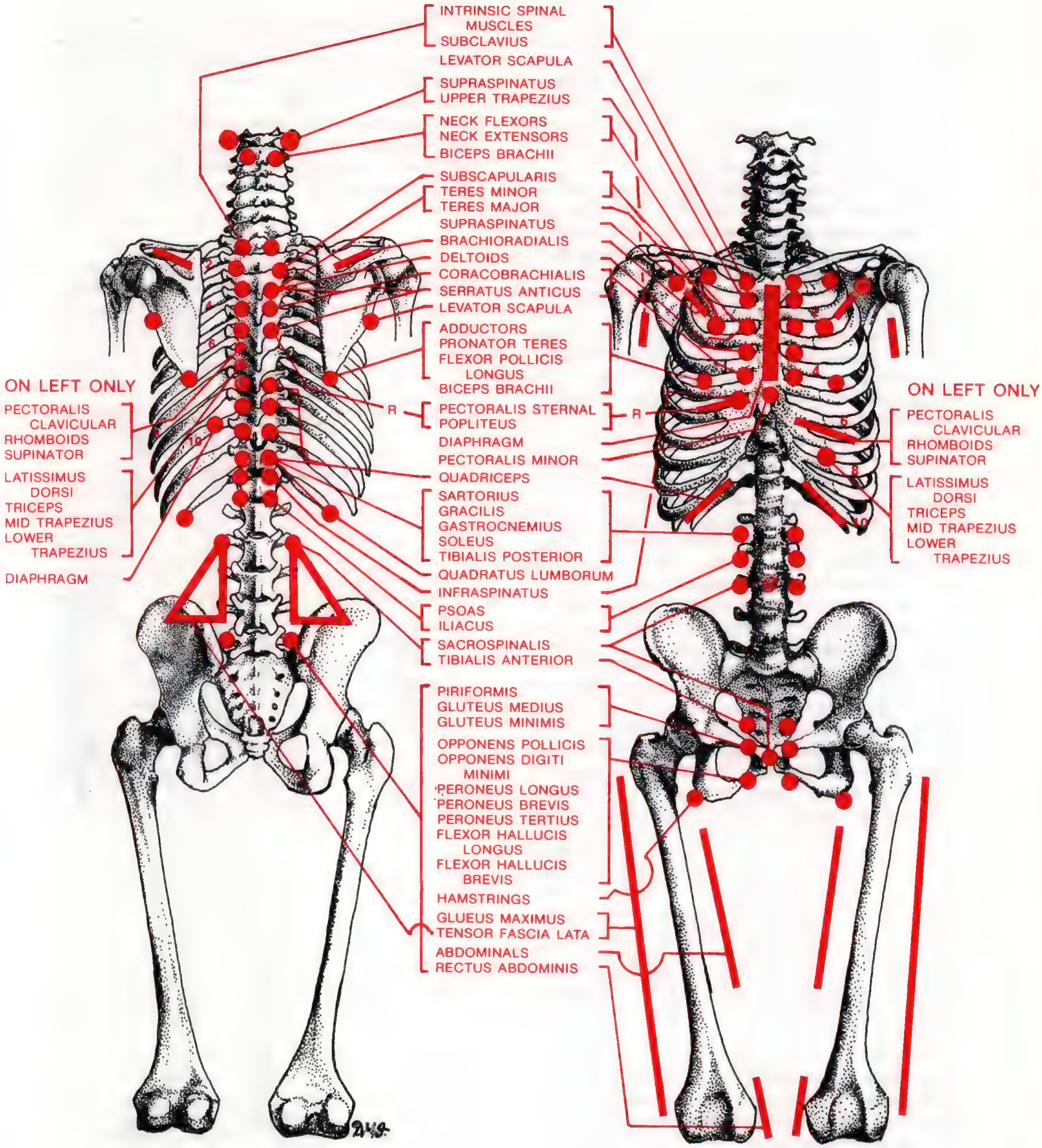
There is often tenderness in the belly or origin and insertion of a muscle involved with an active neurolymphatic reflex. There may also be tenderness over an organ or gland which is associated with the reflex. Frequently the associated tenderness is greatly reduced or removed with treatment of the neurolymphatic reflex. This change is a good criterion for determining the length of time to treat a reflex that does not show positive therapy localization.

The neurolymphatic reflex treatment is a lasting one if it is the only involvement, or if the primary involvement is corrected. Repeated need for the correction of a specific neurolymphatic reflex is indicative that some primary problem of that organ, gland, or muscle is reactivating the neurolymphatic reflex. When active neurolymphatic reflexes recur after what appeared to be adequate treatment, the physician should refer to the triad of health and known associations of the reflex to determine why the problem keeps recurring.

The triad of health is of value in finding the basic underlying cause because it gives a systematic approach to reviewing the possible causes. If a patient has a structural strain from subluxations, poor postural habits, occupational strains, etc., a specific muscle or muscle group may be making excessive effort for correction or maintenance of posture. Reactivation of the associated NL is clinically observed when this type of structural problem exists. Chemical stress, influencing the liver, adrenals, bowel, etc., will also activate associated neurolymphatic reflexes; they will continue to return until the chemical stress has been removed. It may require a change in diet or medication, or removal of environmental toxins. Likewise, the mental side of the triad of health can influence many neurolymphatic reflexes, apparently through the muscle-organ/gland association. The most common clinical entity in this division is relative adrenal insufficiency as a result of emotional stress. The pectoralis major (clavicular division) and the stomach are also often involved. The muscle-organ/gland association with the triad of health helps to search out the cause of recurrent active neurolymphatic reflexes on a clinical basis. Recidivism of these reflexes is clinical evidence that the condition has not been corrected.

Many active neurolymphatic reflexes indicate a systemic involvement in the lymphatic system. Dehydration is one of the most common reasons for general neurolymphatic reflex involvement. Lack of water is possibly the most common nutritional deficiency. The patient who shows indications of dehydration should drink eight glasses of fresh water each day. Interestingly, correction requires that water be drunk; coffee, tea, and other drinks do not appear to be metabolized by the body in the same manner, and are not as effective in correcting the condition. Dehydration can frequently be observed by testing several muscles on the patient which are weak, and then simply having him drink a glass of fresh water. Re-test the muscles, observing for change. Often there will be a dramatic increase in strength, indicating the need for more water.

Generalized active neurolymphatic reflexes also indicate a possible need for general drainage of the lymphatic system. This is tested and accomplished with the retrograde lymphatic technique, developed in applied kinesiology by Goodheart.



13—2. Neurolymphatic reflexes.

RETROGRADE LYMPHATIC TECHNIQUE

Certain patients who show evidence of lymphatic congestion by edematous extremities, decreased resistance to infection, and other signs sometimes do not respond to treatment used to improve lymphatic flow. These enigmatic conditions may show a rather diffuse tissue congestion, which appears to be the result of poor lymphatic system drainage. On the other hand, there may be no outward appearance of lymphatic congestion.

A system developed by Goodheart[7] appears to influence lymphatic drainage of the thoracic duct and the right lymphatic duct as they empty into the venous system at the junction of the subclavian and internal jugular veins on their respective sides. The hypothesis of the mechanism for this technique was developed after clinical use appeared to improve generalized lymphatic drainage.

This approach was first used on a patient of Goodheart's who had a non-responsive anemia. His hemoglobin was nine gram percent and would not rise above ten gram percent, regardless of the treatment given by a hematologist. Goodheart used the known applied kinesiology approaches, but the patient's hemoglobin still failed to rise above ten gram percent.

Bilaterally weak tensor fascia lata muscles had previously been associated in applied kinesiology with cases of severe anemia. In an effort to find some factor involved with the anemia, Goodheart rationalized that disturbed lymphatic drainage could somehow disturb the hemopoietic activity of the body, perhaps in the long bones. The patient was placed in a 20° retrograde position (supine, with his head lower than his feet) to use gravity to help with lymphatic drainage. The tensor fascia lata muscle was tested to observe any change. Rather than improving the strength as expected, the bilateral tensor fascia lata muscles remained weak and all the muscles of the body also weakened on manual muscle testing. Interestingly, a technique described by Zink and Lawson[22] to improve lymphatic flow immediately returned strength to the muscles, observed on manual muscle testing. This technique is axillary traction applied bilaterally in a cephalad direction. With the patient remaining in the retrograde position, the muscles immediately became weak as soon as the axillary traction was removed. Goodheart found that applied kinesiology techniques applied to the pectoralis minor muscle, and certain other procedures, more permanently removed the indices of muscle weakness in the retrograde position.

To help understand the probable mechanism, it is necessary to briefly review the major lymphatic vessels as they drain into the venous system. First, it is important to remember that there is not a great amount of pressure in the lymphatic vessels for lymph movement. In the smaller vessels, lymph is moved primarily by external forces, such as the contraction of muscles squeezing on the vessel and causing lymph to move in one direction, regulated by the valves in the vessel. In larger vessels, such as the thoracic duct, the smooth muscle fibers in the vessel wall contract rhythmically to propel the lymph in the direction allowed by the valves. The major lymphatic drainage of the body is through the thoracic duct.[10] The only exceptions are the right side of the head, neck, and thorax, the right upper limb, the right lung, right side of the heart, and the diaphragmatic surface of the liver. These areas are drained by the right lymphatic duct.

The thoracic duct passes into the root of the neck and forms a rather sharp arch which rises about three to four centimeters above the clavicle. It then crosses ventral to the subclavian artery, the vertebral artery and vein, and the thyro-cervical trunk or its branches. It also passes

13—3. General lymphatic system.

ventral to the phrenic nerve and the medial border of the scalenus anticus muscle, and dorsal to the left common carotid artery, vagus nerve, and internal jugular vein. It ends by opening into the angle of the junction of the left subclavian vein with the left internal jugular vein.[10] There is a pair of semilunar valves at the termination which prevent the passage of venous blood into the lymphatic system.

The right lymphatic duct is short, about 1.2 centimeters in length, and receives collection from the jugular, subclavian, bronchomediastinal, and right lymphatic trunks. It ends near the junction of the right subclavian and internal jugular veins. Here, too, the orifice into the venous system is guarded by a pair of semilunar valves.

It seems reasonable that structural stress in the shoulder girdle and in the region of the root of the neck could impinge on either the thoracic duct or the right lymphatic duct as they arch superior and anterior, ending at the junction of the subclavian and internal jugular veins. The impingement could be from the surrounding structures, or traction on the investing fascia of the area. In any event, there is clinical support to this hypothesis by the apparent improvement of lymphatic drainage when the techniques described are followed.

Indications for Use

The physician should examine for need of retrograde lymphatic technique whenever there is indication of lymphatic congestion. This may be evidenced by edema, reduced resistance to infection, areas which will not heal, etc. The problem may surface after prolonged weight bearing or after being static for long periods. Breathing problems are also an indication, as there is often clinical improvement in the patient's respiration. This is probably due to improved lymphatic flow, as well as improved function of accessory respiratory muscles. Zink and Lawson[22] indicate that their pectoral traction treatment for improvement of lymphatic flow influences upper respiratory, sinus, ear and eustacian tube infections, nose and throat problems, common colds and tonsilitis, lower respiratory infections (such as bronchitis and pneumonia), and refractory tennis elbows, sprained ankles, and low backache; there is even reference to nocturnal frequency of urination.

An anecdote from my practice in the early use of retrograde lymphatic technique is typical of some of the surprising results that may occur from its use. A male patient, age 65, sustained trauma to his right ankle and foot. Severe swelling with pitting edema immediately developed. X-ray findings were negative, and there were no major subluxations or other applied kinesiology findings. The patient was placed on crutches and his ankle wrapped, with instructions to periodically elevate it. After ten weeks, the ankle was still swollen despite being elevated several times a day. It was obvious the patient was not creating a problem by walking; his foot and ankle were so painful that walking was impossible. Neurolymphatic activity, massage, and electrotherapy were used to help improve lymphatic drainage to the area. The only remarkable factor was that the individual had moderate arteriosclerosis. I then learned about the retrograde lymphatic treatment from Goodheart. When this patient was examined in the retrograde position, he was found to need the treatment. It was administered as described here, and within three days the severe pitting edema and pain were removed from his ankle and foot. His foot appeared almost normal, and he was able to walk approximately six days after the retrograde lymphatic treatment. It was not needed again, and his foot and ankle returned to normal without further incident.

Examination

The patient is placed in a 20° retrograde position, with his head lower than his feet. This can easily be done in most chiropractic offices by placing the patient supine on a hi-lo table, with his head at the foot end. The table is then raised to 20°, and the patient is tested. If a hi-lo table is not available, pillows can be used to change the patient's angle.

Previously strong indicator muscles are evaluated for weakening on manual muscle testing. It is not known why muscles weaken when an individual is placed in this position; one may speculate that it places increased pressure on the poorly draining lymphatic vessels, stimulating baroceptors which bombard neuronal pools and disrupt the system. Admittedly, this is a highly speculative basis for the mechanism, but none better has been offered at this time. Two methods seem to confirm that the shoulder girdle and possible blockage of lymphatic drainage are responsible for this muscle weakening. An assistant can apply axillary traction in a cephalad direction to give the pectoral stretch developed by Zink and Lawson.[22] If the technique described below is needed, there will be an immediate strengthening of the muscles which previously tested weak in this position, as indicated by manual muscle testing. Another method which does not require an assistant is to have the patient flex one or both shoulders to 180°, placing his arms above his head. This apparently opens the drain of the lymphatic system, and the previously weak indicator muscles strengthen (13—4, 5).

The site of apparent blockage can be determined by the side of shoulder flexion which abolishes the weakening of indicator muscles. In approximately 90% of the cases, flexing the left shoulder to 180° will cause the indicator muscles to strengthen; in some cases the right side is required, and in others, both arms must be elevated. This correlates with the way the body is drained, as the majority drains through the thoracic duct and empties into the venous system on the left side.

Correction

Therapeutic efforts to correct this condition require knowledge of applied kinesiology techniques for muscle correction. Techniques mentioned here — origin/insertion, Golgi tendon organ and muscle spindle cell, fascial release, and spray and stretch — are discussed in Chapters 10 and 11.

It appears that the structural problem influencing retrograde lymphatic flow is disturbance in the shoulder girdle, especially around the root of the neck. Goodheart found that the primary involvement is usually disturbance in the pectoralis minor muscle, and additional follow-up is required. Whenever retrograde lymphatic involvement is found, the physician should evaluate the pelvis for its possible influence on the shoulder girdle. Shoulder girdle

13—4. Retrograde position with shoulder flexed as shown. Positive test should be abolished (see text).

13—5. Pectoral stretch being applied in retrograde position.

stress is often secondary to pelvic torsion or other disturbance. Correction of the shoulder girdle will be short-lived without correcting pelvic imbalance. Likewise, the entire weight-bearing mechanism should be evaluated. In addition to frank gravity, the structural strain of weight bearing when the body is distorted may be a reason why individuals with poor lymphatic drainage feel worse at the end of a day when there has been considerable weight bearing.

In this condition, the pectoralis minor muscle is typically stretched or in a state of hypotonicity. This appears to allow the ribs to drop inferior. Disturbance in the shoulder girdle, especially at the root of the neck, is generally evidenced by considerable tenderness when the physician applies digital pressure to this area. There is usually additional tenderness at the origin and insertion of the pectoralis minor, as well as in the belly of the muscle.

If the pectoralis minor is found to be weak, the usual AK methods to strengthen a muscle are required. Evaluate for neuromuscular spindle cell and Golgi tendon organ involvement. The spindle cell requires bidigital pressure directed away from the center of the muscle belly, while the Golgi tendon organ manipulation is toward the belly.

The pectoralis minor may test normal but weaken after moderate stretching. In this case the muscle is tight, which draws the shoulder girdle down by traction on the coracoid process. Since the structures of the entire root of the neck are invested in fascia, distortion causes considerable disturbance which can influence the lymphatic drainage into the venous system. The muscle weakening after stretching is indicative of the muscle stretch response, requiring either fascial release or spray and stretch technique.

In this case, treatment to the pectoralis minor usually requires the fascial release technique, which is designed to improve the relative length of the pectoralis minor's investing fascia with the muscle length. Examination for the need of this technique, as well as that of spray and stretch which is occasionally useful in this condition, is accomplished by having the patient stretch the pectoralis minor by quickly contracting the rhomboid and middle trapezius muscles, bringing the scapular vertebral borders together; this moves the coracoid process posterior and slightly superior, stretching the pectoralis minor. The pectoralis minor, strong before the stretch, will weaken as observed on manual muscle testing immediately after the stretch. If there is no weakening after stretch, Golgi tendon organ or muscle spindle cell technique is probably needed.

The Golgi tendon organ or muscle spindle cell is therapy localized to determine the possible need for treatment to lengthen the muscle. If there is positive therapy localization to either of these proprioceptive areas, treatment is applied with digital pressure. For neuromuscular spindle cell to lengthen a muscle, the pressure is applied over the spindle cell with two fingers, bringing them together. If Golgi tendon organ treatment is indicated, the pressure is applied over the receptor, away from the muscle belly.

Often pectoralis minor shortening is secondary to

weakness of the middle and lower trapezius muscles. When the lower trapezius weakens, the scapula moves superior and lateral, which brings the coracoid process anterior and inferior; this reduces antagonistic action to the pectoralis minor. A basic tenet in applied kinesiology is that an unopposed muscle tends to become hypertonic. When retrograde lymphatic treatment is necessary due to a tight pectoralis minor muscle, the primary cause is often a functional dorsal-lumbar fixation resulting in bilateral lower trapezius weakness and secondary pectoralis minor contraction.

The neurolymphatic reflex for the pectoralis minor is located on the gladiolus just above the xiphoid process. This neurolymphatic reflex is generally very tender when active, and should be manipulated until tenderness has been removed; this may take one or two minutes. The neurolymphatic reflex for general respiratory activity is located along the entire length of the sternum; it may also need manipulation.

Occasionally in this condition the pectoralis major (clavicular and sternal divisions) requires attention for shortening of the muscle. The divisions are evaluated by muscle stretch response and for involvement of the proprioceptors in the same manner as the pectoralis minor.

The serratus posterior-superior and serratus posterior-inferior muscles are frequently involved with the retrograde lymphatic problem. They are generally shortened and hypertonic, and are evaluated with neuromuscular spindle cell and Golgi tendon organ technique.

The entire thoracic cage and its accessory muscles should be evaluated in a manner similar to that discussed in Volume V under "Respiratory Conditions." Frequently there are rib fixations or subluxations which need attention. The general approach to retrograde lymphatic activity usually improves breathing and circulatory function.

Goodheart has found it clinically effective to routinely add vitamin A when retrograde lymphatic treatment is given. The two types he has found effective are a natural vitamin A of 1,500 international units, given three times per day, or emulsified vitamin A.

MECHANICAL STIMULATION OF LYMPH FLOW

It has long been established that properly applied massage stimulates lymphatic flow. This was described as far back as 1894 by Starling.[18] Drinker[4] demonstrated a definite increase in lymph flow by massage. Mechanical systems applying rhythmic compression to limbs have been devised. Wakim[20] studied the application of centripetal rhythmic compression by the use of a vasopneumatic apparatus. Edema was reduced, the tissues became softer, and pain was relieved.

Influence on lymphatic flow can usually be clinically observed when the body is returned to a more harmonious structural function. The technique of rolfing[15] directs attention to the connective tissues of the body, usually with a deep massage designed to improve body integration. Rolf claims improved lymphatic flow among other benefits from this therapeutic approach.

Exercise and general physical activity are known to improve lymphatic flow. The neurolymphatic reflexes originally developed by Chapman have been effectively used in applied kinesiology, along with the more recently initiated retrograde lymphatic technique. Yet localized areas of edema sometimes remain which do not seem to respond as effectively as desired to all the available therapeutic approaches.

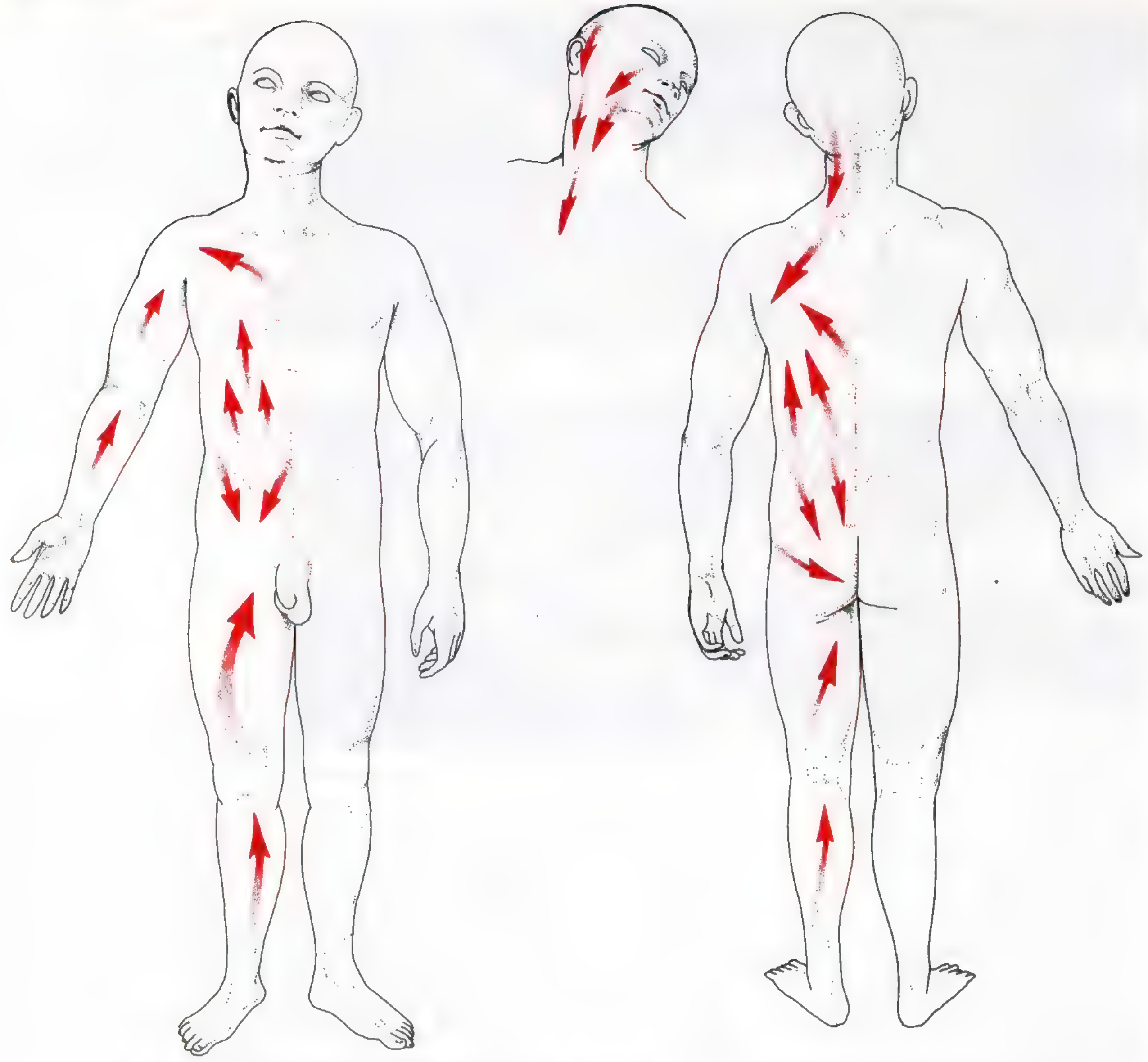
A method of diagnosing the need for mechanical stimulation and a therapeutic approach were introduced into applied kinesiology by Sabella.[16] The system developed because of the failure of a procedure expected to enhance lymphatic flow.

In working with patients who did not respond to the usual neurolymphatic and retrograde lymphatic techniques, Sabella attempted to enhance lymphatic flow to a muscle by having the patient make repeated contractions of the muscle. This was expected to increase the lymphatic drainage of the muscle because of the mechanical compressing action on the lymphatic capillaries and vessels. Instead, the repeated contraction against a standard testing pressure caused the muscle to become increasingly weaker.* This weakening developed even though there had been previous correction of any involvement of the neurolymphatic and neurovascular reflexes, retrograde lymphatic position, and muscle stretch response to the involved muscle.

Sabella describes a system of manual lymph drainage developed by Vater and Asdonk[19] of Germany. They describe the directional flow of the lymph system for a special massage technique. The direction of flow is one which would ordinarily be expected, with an interesting division at the umbilical level where the flow in the abdominal and sacrospinalis muscles is directed superior above the umbilical line and inferior below it.

Sabella uses therapy localization over the muscle which was identified by its weakening on repeated muscle testing. The therapy localization is administered on the distal aspect of the muscle with a light tissue pull in the direction of lymph flow. A previously strong indicator muscle is tested for weakening. If there is none, therapy localization is re-administered proximal to that just completed, and again the indicator muscle is tested. This procedure is repeated until the indicator muscle weakens, which appears to indicate the distal limit of lymphatic congestion. The therapy localization tissue pull procedure is continued until the indicator muscle no longer weakens. This procedure delineates the distal and proximal limits of the apparent lymphatic congestion.

*The repeated muscle testing and its consequent weakening is the same diagnostic factor as Goodheart's technique regarding circulation and lymphatic function described next as aerobic/anerobic muscle function.



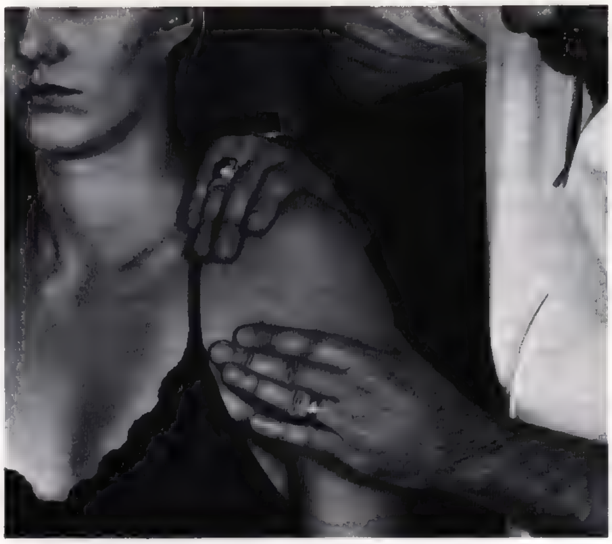
13—6. Direction for mechanical stimulation for lymph flow, as advocated by Vater and Asdonk.[19]

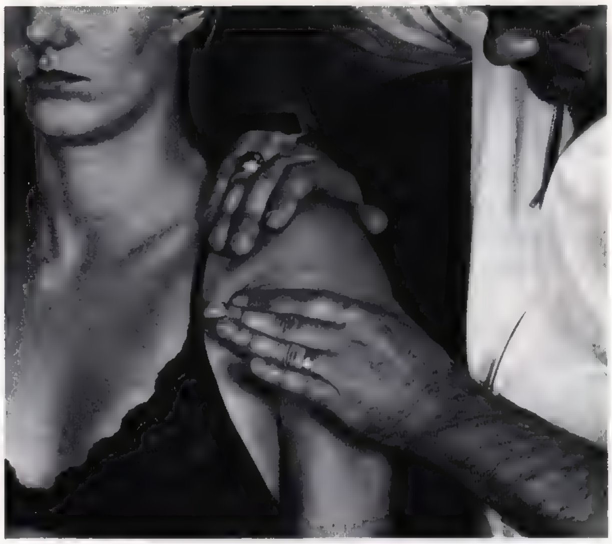
Correction

First, neurolymphatic and neurovascular reflexes are corrected if they are found to be active. Then the patient is tested for blockage of the general lymphatic system by the retrograde lymphatic technique. These procedures will sometimes eliminate the need for mechanical lymphatic stimulation as indicated by the above test, but usually they will not. Their correction prior to the mechanical stimulation is important because it enhances the procedure. If there is a muscle stretch response (described on page 169) in the muscle to be treated, it does not need to be treated first; the mechanical stimulation of lymphatic flow usually makes this correction. There may be some connection between myofascial integration and its influence on lymphatic flow.

If the muscle is located in an extremity, the usual procedure is for the physician's entire hand(s) to encircle the muscle, with the edge of the hand at a right angle to the muscle fiber. The first contact is made at the proximal edge of the lymphatic congestion, previously delineated by therapy localization. Pressure, between one and two pounds, is applied in the direction of the flow, as shown in illustration 13—7. The motion is a pumping action to the limit of the patient's skin excursion. Another contact is made immediately distal to the first, and the procedure is repeated until the entire area delineated by therapy localization is covered. The physician then begins again at the proximal area of involvement, and repeats the procedure over the entire area four or five times.

This technique may relate to mechanical stimulation causing the lymphatics to be more permeable.[2] In any event, the muscle treated in this manner does not weaken





13—7. The thumb edge of the hand is used to mechanically stimulate lymph flow toward the heart. Skin contact is maintained; there is no slipping over the skin, but rather a motion to the limit of the patient's skin excursion. Re-contact immediately distal, and repeat until the entire area delineated by therapy localization is covered.

on repeated muscle testing. The treatment is generally lasting and does not need to be repeated. If the problem returns, refer to aerobic/anerobic muscle function on page 230.

SUSTAINED MUSCLE USE

Muscles are made up of two primary types of fibers — slow contracting and fast contracting. The slow contracting fibers are sometimes called red fibers, and the fast contracting ones are referred to as white fibers. They are also sometimes known as "slow twitch" and "fast twitch" muscle fibers. There is a considerable difference in the function of the two types. A muscle is made up of higher concentrations of one type, depending on its primary function. Slow contracting fibers are those capable of sustaining more continuous contraction, while the fast fibers are phasic in nature and used for quick, intricate motions.

Muscle color gives some indication of the dominant fibers. A generalization can be made by recognizing the red muscles as dominant in slow fibers with greater endurance, while the white muscles have more fast fibers with less endurance. There is variance among species and within the same animal.[2] The pigeon has a crimson red pectoralis muscle, while the chicken has a very white pectoralis. This gives some indication of the nature of the muscle activity. The chicken is characteristically given to only short bursts of flight, while the carrier pigeon can sustain flight for prolonged periods.

Slow muscle fibers are smaller and deep red. The color comes from the high concentration of myoglobin, which is muscle hemoglobin. The myoglobin has a greater affinity for oxygen than does blood hemoglobin, and serves as an oxygen supply within the muscle fiber to rapidly supply mitochondria as the need arises. The ability of the myoglobin to load and unload oxygen for the aerobic activity of the slow fibers enables sustained adjustment to postural changes over prolonged periods.

The fast fibers have little or no myoglobin, giving them their white appearance. They are larger in diameter and have less mitochondria. The white muscle fiber metabolizes glycogen by enzymatic activity and is anerobic.

The extraocular muscles of the eye are examples of domination by fast twitch fibers, while the postural soleus is an example of slow muscle fiber domination. The isometric contraction time[2] of the lateral rectus eye muscle is 7.5 msec., while the postural soleus has a contraction time of 90 msec. A skeletal muscle with phasic activity is the gastrocnemius, with a contraction time of 40 msec. The extraocular muscle contraction is five times faster than that of the gastrocnemius, and twelve times faster than that of the soleus.

The dominancy of fiber appears to fit the role required of the muscle.[9] The gastrocnemius and soleus are excellent examples of this. Although both muscles insert into a common tendon, their basic functions are different. The soleus is in constant use in postural balance. When the body begins to lean forward a stretch reflex activates the soleus, which can be under contraction for prolonged periods of time without fatigue. If the body leans backward, a stretch reflex activates the anterior tibial muscle, which is antagonist to the soleus. It is capable of giving strong

plantar flexion, and can shorten adequately to accomplish full ankle extension. On the other hand, the gastrocnemius is designed for uneconomical, quick, short bursts of activity as in running and jumping. It does not have the ability to shorten like the soleus because of its short pennate fiber arrangement. There is complimentary action between the gastrocnemius and the soleus, giving a higher level of functional performance as needed.

Biopsy and autopsy have shown that the soleus muscle has a mean of about 70% slow muscle fiber and 30% fast, while the gastrocnemius has a mean of 50% of each. Ochs et al.[14] studied the fatigue characteristics of the two muscles with electromyography and found that the gastrocnemius fatigued more rapidly, consistent with the higher percentage of fast muscle fibers.

Each motor unit has one type of muscle fiber innervated by a common neuron. There are two groups of alpha motor neurons defined as fast and slow motor neurons. These are also referred to as phasic and tonic, and respectively supply the fast and slow motor units. Each motor unit receives one or the other type alpha motor neuron, but not both. The frequency of impulses is faster in the phasic motor neuron, and slower in the tonic. It takes fewer stimuli per second to produce a smooth, sustained maximal contraction in the red (slow) muscle fibers than in the white ones.

In the newborn, all muscle fibers are equally slow,[2] but in a relatively short time they reach their adult speed. This appears to be the result of the type of nerve impulse the muscle motor unit receives. If the spinal cord is transsected, the gastrocnemius and soleus fail to develop their specified concentrations of red and white muscle fibers, and they develop similar concentrations.

The type of stimuli that the muscle motor unit receives determines its nature. Experiments[9] to transplant a phasic nerve fiber from a muscle motor unit to one which has slow muscle fibers causes a transformation of the muscle into a fast fiber. This is important, because there is evidence that the dominant concentration of fibers is determined genetically,[2] and they can be adapted by the type of nerve supply they receive.[9] Constant postural stimulation may give a different stimulation to the muscle, causing it to adapt to a different concentration of fiber type. This may be a factor in chronic structural strain placing different responsibilities on the muscles. A muscle which is ordinarily phasic may be placed under constant stress as a result of postural strain and thus adapt to a higher concentration of tonic fibers, which would change the characteristic of the muscle.

Adaptation of the concentration of the types of motor units depends on the type of stimulation the muscle fibers receive. Artificially stimulating the muscle can change it to a higher concentration of fast or slow fibers. It is believed that the constant activity required of postural muscles causes them to develop the higher concentration of tonic fibers. This appears to be important in normal physiological development, abnormal change from postural strain, and in desired change for athletic training purposes.

Electromyography shows the normal soleus to be continuously active in adult rabbits. Tenotomy causes the activity to cease, even with intact motor innervation. The normally red, slowly contracting soleus is transformed into a white, fast contracting muscle similar to the gastrocnemius. This evidence in the laboratory animal seems to indicate that failure of normal antagonism to a muscle could cause a change of concentration of motor unit type. If this is so, it may explain some clinical observations regarding the antagonist to a weak muscle. In applied kinesiology it has been observed that an antagonist to a weak muscle becomes short and hypertonic. When the antagonist loses the counteracting agonist muscle's activity because of weakness, it seems possible that the resulting change of activity of the motor neurons may cause an adaptation of the concentration of the muscle fiber. As has been mentioned, constant stimulation to postural muscles causes increase in the tonic muscle fiber concentration.[9] Postural imbalance as a result of a weak agonist may cause constant stimulation to the antagonist, changing the concentration.

Most, if not all, muscles have combinations of the two fibers. The balance of these fibers and their ability to contract for their respective roles appear to have a wider range of application in health problems than is currently recognized. As Best and Taylor[2] state, "Nature has devised a mechanism whereby the mechanism employs tonic and phasic contractions which combine to provide an exquisite range of functional activity about which there is still much to learn."

AEROBIC/ANEROBIC MUSCLE FUNCTION

Possible Roles of Myoglobin and Fat on Muscle Function

Evaluating a patient with manual muscle testing may sometimes fail to reveal any evidence of muscle dysfunction, yet the individual displays functional disturbance after sustained activity. The usual approach is to look for subclinical weakness by therapy localizing the five factors of the IVF, evaluating for muscle stretch reaction, etc. Still, a muscle involvement sometimes cannot be found.

Goodheart[8] observed such a condition in a competitive skier who could not maintain a tight tuck at the end of a downhill run. Thorough evaluation of the muscles which could potentially be involved revealed no dysfunction. Considering the fact that the problem developed only toward the end of the run, repetitive muscle testing was used to determine muscle endurance. After testing four or five times, the previously very strong medial hamstring became exceptionally weak. Repeated testing on the opposite side could be continued twenty times without weakening the muscle. An enigma was present as Goodheart stated, "I have an answer, but haven't asked a question." In an effort to find a therapeutic approach that would eliminate the finding, the test was repeated and the patient was asked to therapy localize various reflexes known in applied

kinesiology. When the neurolymphatic reflex was therapy localized as the test was done, there was no muscle weakening. (This seems to correlate with the independent finding of Sabella, described previously.) Goodheart rationalized that the slow muscle fibers were incapable of continuing to function in their usual sustained way. Because therapy localization to the neurolymphatic reflex abolished the response, it was believed that the lymphatic system was not adequately clearing the interstitial tissue spaces. In this case, osmotic pressure would remain high and fat molecules could not move to supply the slow muscle fibers for their aerobic metabolism. He hypothesized that in this case, sustained action of the slow fibers would not be available for continued muscle function. In the first few tests the fast fibers function adequately, but they are unable to maintain continued activity because of their phasic nature. The slow muscle fibers, being aerobic, require both myoglobin for oxygen and fat for conversion to ATP.

The therapeutic approach that Goodheart recommends is prolonged neurolymphatic reflex stimulation. It should be noted here that this is generally a case where the neurolymphatic reflex does not therapy localize as indicated by a previously strong muscle weakening. Indication of neurolymphatic involvement is the cancelling of muscle weakness on repeated muscle testing when the neurolymphatic reflex is therapy localized with the testing.

Neurovascular reflex stimulation is also usually indicated and is more often needed when the muscle has a high concentration of fast fibers. It does not usually show positive therapy localization in the standard manner. Therapy localization to the reflex while the repeated muscle test is done will abolish the positive response, indicating need for its stimulation.

In the presence of muscle cramping when muscle testing is repeated, Goodheart recommends a nutritional supplementation depending on the concentration of fibers — iron for slow and pantothenic acid for fast concentration. This correlates with the requirement of myoglobin for high levels of oxygen during the aerobic process of the slow muscle fiber contraction.

Applied kinesiology approaches to repeated muscle testing and fast and slow muscle fibers is relatively new. Undoubtedly, more information will be uncovered regarding the use of these concepts, and a better understanding of the probable physiology will develop.

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Chapter 14

Blood Vascular System

Blood circulation has various controlling factors. These may come from the heart, the nervous system, fluid balances, constituents in the blood, and tissue demands, among many others. Disturbance in regulation of blood flow can develop on any side of the triad of health. It may be structural, chemical, or mental interfering with, or influencing, blood circulation directly or indirectly by influencing the controlling mechanisms of circulation.

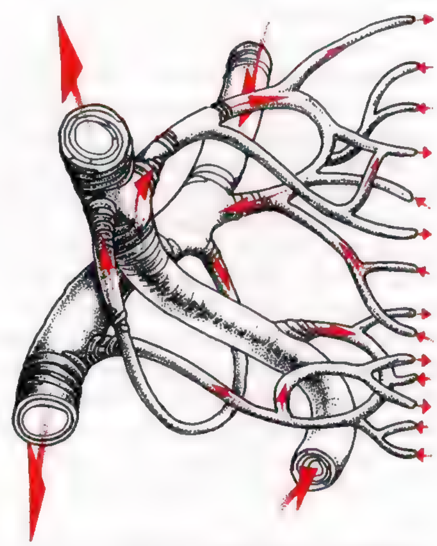
Applied kinesiology deals with the blood vascular system in many ways. Since we are primarily interested in functional disturbances, it is of value to approach circulatory problems by considering what might disturb function. By evaluating every circulatory disturbance from the aspect of the triad of health, an overlap of causative factors will often be seen.

Control of Circulation

There are three basic types of circulation control:[4] (1) local, (2) neurologic, and (3) humeral.

Microcirculation of the blood[7] begins with the arteriole and ends with the venule. The arteriole has a heavy, muscular coat; the venule does also, but to a lesser degree. The amount of blood going into microcirculation is controlled by the muscular coat of the arteriole, which in turn is controlled by the sympathetic nervous system; the same is true for the muscular coat in the venules. The sympathetic fibers carry both vasoconstrictors and vasodilators. These are under supraspinal control from the vasomotor center. They are located bilaterally in the reticular substance of the lower third of the pons, and the upper two-thirds of the medulla. The upper lateral portion is related with vasoconstriction and is tonically active, with impulses firing about one-half to two impulses per second.[4] This causes a continuous partial contraction of the blood vessels, known as vasomotor tone. The medial and lower portions of the vasomotor center transmit inhibitory impulses into the upper lateral vasoconstriction area, causing vasodilation. The vasomotor also influences the heart rate by sympathetic nerve fiber connections.

The vasomotor center is influenced by higher centers located throughout the reticular substance of the pons, mesencephalon, and diencephalon. Both vasoconstriction and vasodilation can be influenced from these higher centers through the vasomotor center.



14—1. Note muscle fibers encircling the vessels.

It is hypothesized that vascular circulation is influenced by somatoautonomic reflexes used in applied kinesiology. When treating what appear to be vascular reflexes, a pulsation is felt in the skin area which does not correlate with the patient's pulse rate. It seems possible that this pulsation

may correlate with the tonic nerve impulses which are continually developing in the vasoconstrictor area of the vasomotor center.

From the arterioles, the vessel transitions into the metarteriole, which has smooth muscle fibers wrapping around the vessel but in a considerably lesser amount than the arteriole. These muscle fibers apparently have no connection to the sympathetic nervous system. One theory of local circulatory control is that smooth muscle requires oxygen to contract. When the oxygen content in the blood is low, the muscle is incapable of contracting to allow vessel dilation. As increased blood flow increases the oxygen levels, the smooth muscle contracts, reducing the flow. As the oxygen is used the muscle again weakens, allowing flow to return. Other theories have proposed that the metabolites of tissue function may be vasodilators; when a build-up of these substances develops, the vessel dilates to bring in fresh blood and carry away the products of metabolism.

In applied kinesiology, it is observed that a muscle may weaken when repeatedly tested by the standard methods. It is possible that this weakening under continued use may involve local control of vasodilation and vasoconstriction. This seems to be supported by therapeutic efforts which appear to allow the muscle to be contracted on a continued basis without weakening. One such therapeutic approach is nutritional supplements to increase myoglobin; another is designed to increase lymphatic drainage which would improve removal of tissue metabolites.

The adrenal medulla influences the balance of the autonomic nervous system, which influences the microcirculation of blood. The adrenal medulla receives impulses through the sympathetic nervous system which are developed in the vasomotor center. These impulses arise from the vasoconstriction area and stimulate secretion of norepinephrine and epinephrine. Both usually cause vasoconstriction; however, epinephrine may cause vasodilation under some circumstances.

NEUROVASCULAR REFLEX

In the early 1930s, Bennett[1] designed a reflex technique to influence the vasomotor system. The reflexes that he detailed are primarily on the anterior surface of the trunk and on the head. In Bennett's published lectures[1] there are numerous references to the nervous system, but there is no specific description of the possible mechanism involved in the reflex activity. Bennett considered himself a clinician; he stated,[2] "We will not give you an academic class in neurology, anatomy, or physiology. We will use physiology and anatomy insofar as it is wise for practical purposes. This is a practical course, not an academic one. . . ." Nelson,[6] a close acquaintance of Bennett's and ultimately a lecturer on his work, stated that "Bennett was a clinician through and through; whether he had to sit up all night with a sick patient or go with a patient to a surgeon was a small matter as long as something was learned. He had little time for theorizing academicians or structurally oriented pedagogues. He was convinced function controls structure, and answers had to be found by application." Many discoveries in the healing arts have been developed by individuals with attitudes similar to Bennett's. Unfortunately, the value of their work is often not recognized by general concensus until long after their deaths.

Only a portion of Bennett's work has been correlated into applied kinesiology. This was done by Goodheart,[3] and is a correlation of the Bennett reflexes (primarily those of the head) with their influence on strengthening muscles which tested weak on manual muscle testing and their apparent effect on body function. Bennett's reflexes have become known as "neurovascular reflexes" in applied kinesiology, referring to the apparent nerve association with the vasomotor system. As with the correlation of the neurolymphatic reflexes (Chapman's reflexes), many of Bennett's reflexes correlate with the muscle-organ/gland association of applied kinesiology.

It is believed that the neurovascular reflexes have their neurologic association with the areas they seem to influence by way of embryological unfolding. The skin and nervous system are both derived from ectodermal tissue. It is thought that early developmental association connects the reflex area with the nerves or vasomotor center which controls vessel activity in the respective area. Bennett considered that the unit of physiology is the "vasomotor plexus" at the junction of the artery and the arteriole. He commented on the arteriole, capillary, tissue space, cell, lymph capillary, and the two main branches of the autonomic nervous system, the parasympathetic twig and sympathetic twig. He considered this a major area of influence for his reflex treatment.

Zweifach[7] presents an interesting review of the microcirculation of blood. Although the muscular coat of the larger blood vessels does not continue into the capillary bed, there are constant changes. "At one moment blood flows through one part of the network; a few minutes later that part is shut off and blood flows through another part. In some capillaries the blood even reverses. Throughout this ebb and flow, however, blood passes steadily through certain thoroughfares of the capillary bed." Microsurgery has established that the blood is continuously under muscular control. The muscular sheath of the endothelium becomes thinner and thinner until in the smallest arteriole, it is only one cell thick. Zweifach goes on to state ". . . at the point where each of the branches leaves a thoroughfare channel, there is a prominent muscle structure; the muscle cells form a ring around the entrance to the capillary. It is this ring, or pre-capillary sphincter, which acts as a floodgate to control the flow of blood into the capillary network from the thoroughfare channel." This area, apparently, is

the physiologic unit about which Bennett spoke.

If at all, the muscle cells in the larger vessels of the capillary bed are only sparsely under the influence of the nervous system. Some say that most of the control for contraction and relaxation of these muscle cells is under the effect of corticosteroids and the amines, such as epinephrine. Zweifach believes the mechanism is more complicated; he postulates that cell metabolism produces substances which influence the pre-capillary sphincter to increase blood flow. As the increased blood flow carries off the substances, the flow returns to its original state because there is no longer an influence from the metabolism substance. The oxygen theory has been previously discussed. Obviously, much research is necessary before the exact mechanisms of action can be delineated. Bennett's approach appears to influence the mechanism, giving clinical results testifying to its effectiveness.

In applied kinesiology, the receptors treated as neurovascular reflexes influence muscle strength as observed on manual muscle testing; they also appear to influence remote areas in the body. With biofeedback equipment, Goodheart demonstrated remote thermal changes from the stimulation of neurovascular reflexes. The thermal change does not necessarily develop in a predictable area; it seems that treatment of neurovascular reflexes used in AK tends to influence numerous areas. There is no specific correlation of thermal change with the dermatome or skin overlying the muscle which applied kinesiology associates with the neurovascular reflex being treated. This has also been observed by correlation of blood flow in human muscle and its overlying skin, as a result of administering vasoactive substances.[5] Thermal elevation, although often observed, is unpredictable with current knowledge. It seems reasonable that there is a predictable nature to the thermal elevation with treatment of specific neurovascular reflexes, but it has not been researched and plotted.

Examination

Determining whether a neurovascular reflex is active and associated with a weak muscle can be accomplished by therapy localization similar to that used in evaluating the neurolymphatic reflex. When a muscle tests weak on manual muscle testing, the neurovascular reflex is therapy localized and the muscle is tested to determine if it strengthens, which is a positive indication of association. Therapy localization can also be used over the neurovascular reflex when a previously strong indicator muscle is tested for weakening. This also indicates that the neurovascular reflex is involved.

There are occasions when an apparently active neurovascular reflex will not therapy localize, nor will any of its associated muscles appear weak on manual muscle testing. Examination for this hidden type of activity is done when there is indication that a neurovascular reflex may possibly be involved with a condition which does not maintain its correction. To examine for the association, there must first be a positive challenge or therapy localization in the problem area. In the presence of this positive finding, the neurovascular reflex is therapy localized simultaneously with the diagnostic challenge or therapy localization in the problem area. Abolition of a positive reaction is clinical evidence that the neurovascular reflex is involved with the pattern, as its therapy localization cancelled the positive finding. For example, when a positive muscle stretch reaction has previously been demonstrated, the evaluation can be repeated with neurovascular therapy localization. If the reaction is cancelled, this indicates the neurovascular reflex should be treated.

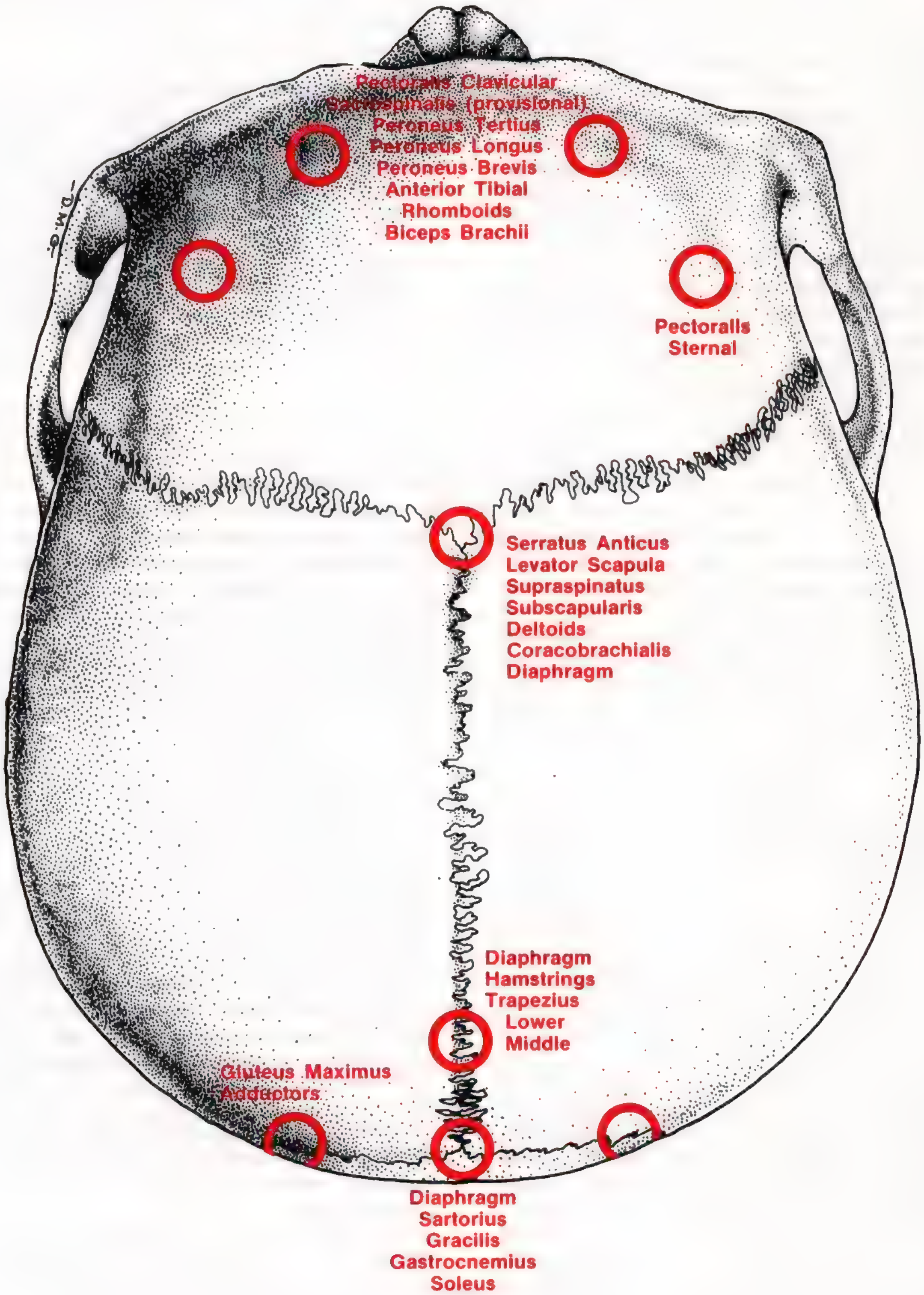
Correction

The neurovascular reflex is accurately located by positive therapy localization. Contact for treatment of the neurovascular reflex is made with a light touch of the examiner's fingertips, and the area tissue is slightly tugged to create a traction; the contact is held while feeling for a pulsation. The pulsation will be in the range of 70-74 beats per minute, varying only slightly. Bennett[1] states, "The metabolic end of the vasomotor nervous system rarely exceeds 74 beats per minute, regardless of the pulse rate or the heartbeat. Rarely does it fall below 70, regardless of the pulse rate." It is possible that this pulsation is related to the tonic nerve impulse which arises from the vasomotor center.

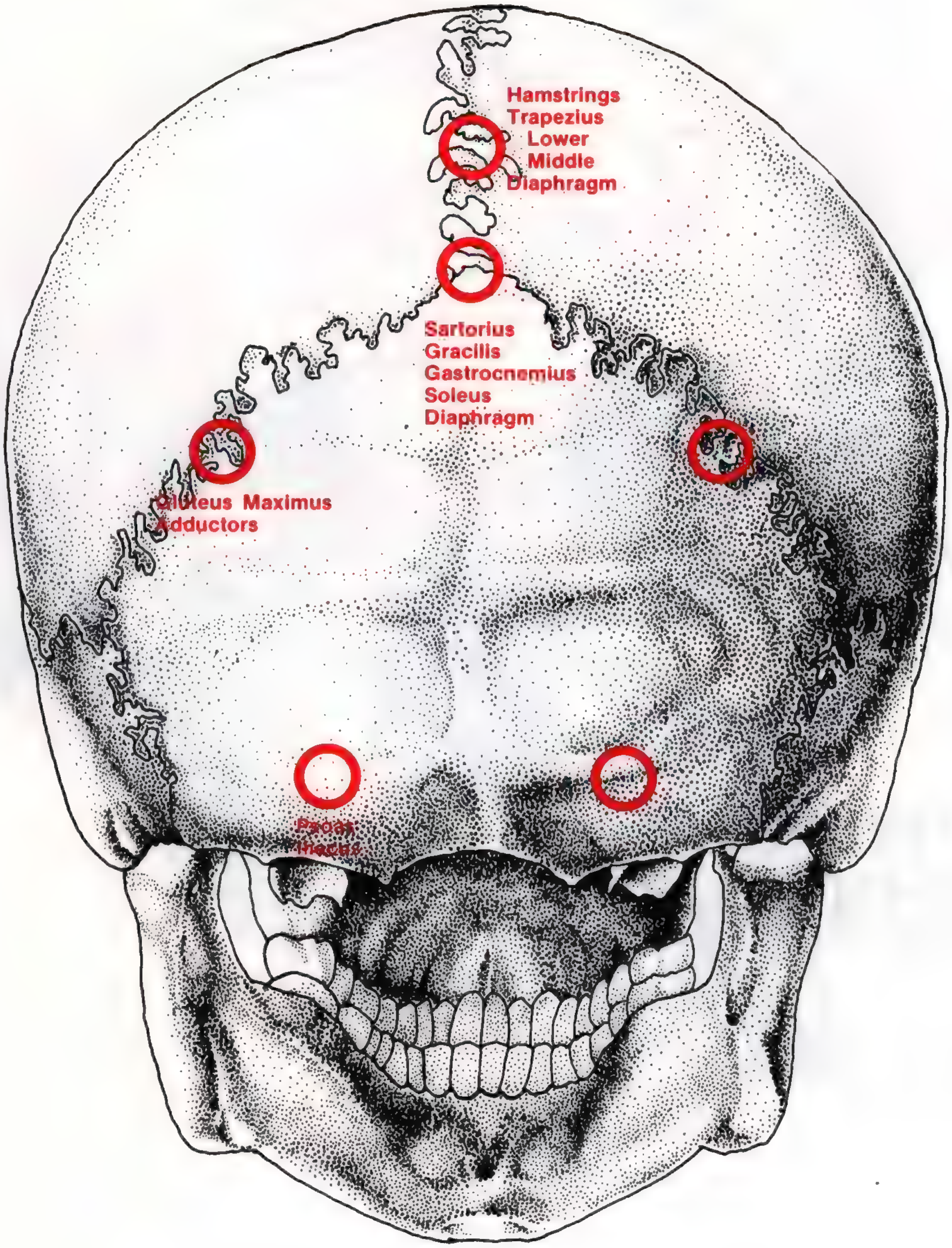
Accurate use of skin traction to develop the maximum amount of pulsation felt at the fingertips is very important for effective treatment of the neurovascular reflex. This point was clearly brought out to this author while experiments were being done with thermal biofeedback equipment. A pulsation was developed by skin traction, and thermal elevation was observed on the biofeedback equipment. During continued contact on the reflex to obtain maximum thermal elevation, it was observed that if the clinician failed to maintain maximum pulsation, and slightly deviated the tissue tug, the effects of the reflex diminished. Loss of the reflex pulsation was often due to talking to the patient and not paying attention to the therapeutic effort. When the pulsation diminished or was lost, the biofeedback equipment revealed diminished temperature elevation, sometimes loss of all the effect previously produced. Ordinarily, when the reflex is treated long enough, nearly all the thermal elevation obtained will be maintained. Regaining the pulsation brought the thermal improvement back. This observation revealed the necessity of very accurate application of neurovascular technique, and in my experience general clinical results improved with greater accuracy of application. A much higher respect for this therapeutic approach was gained from this experience.

Generally, it is not difficult to develop a strong pulsation when treating a neurovascular reflex. However, in some cases it is necessary to attempt the tissue traction in many directions before the pulsation is felt. When a pulsation is felt, the physician should vary the direction of traction slightly to either side to find the maximum amount of pulsation. It seems that the pulsation is much greater in conditions which react dramatically to the neurovascular reflex treatment.

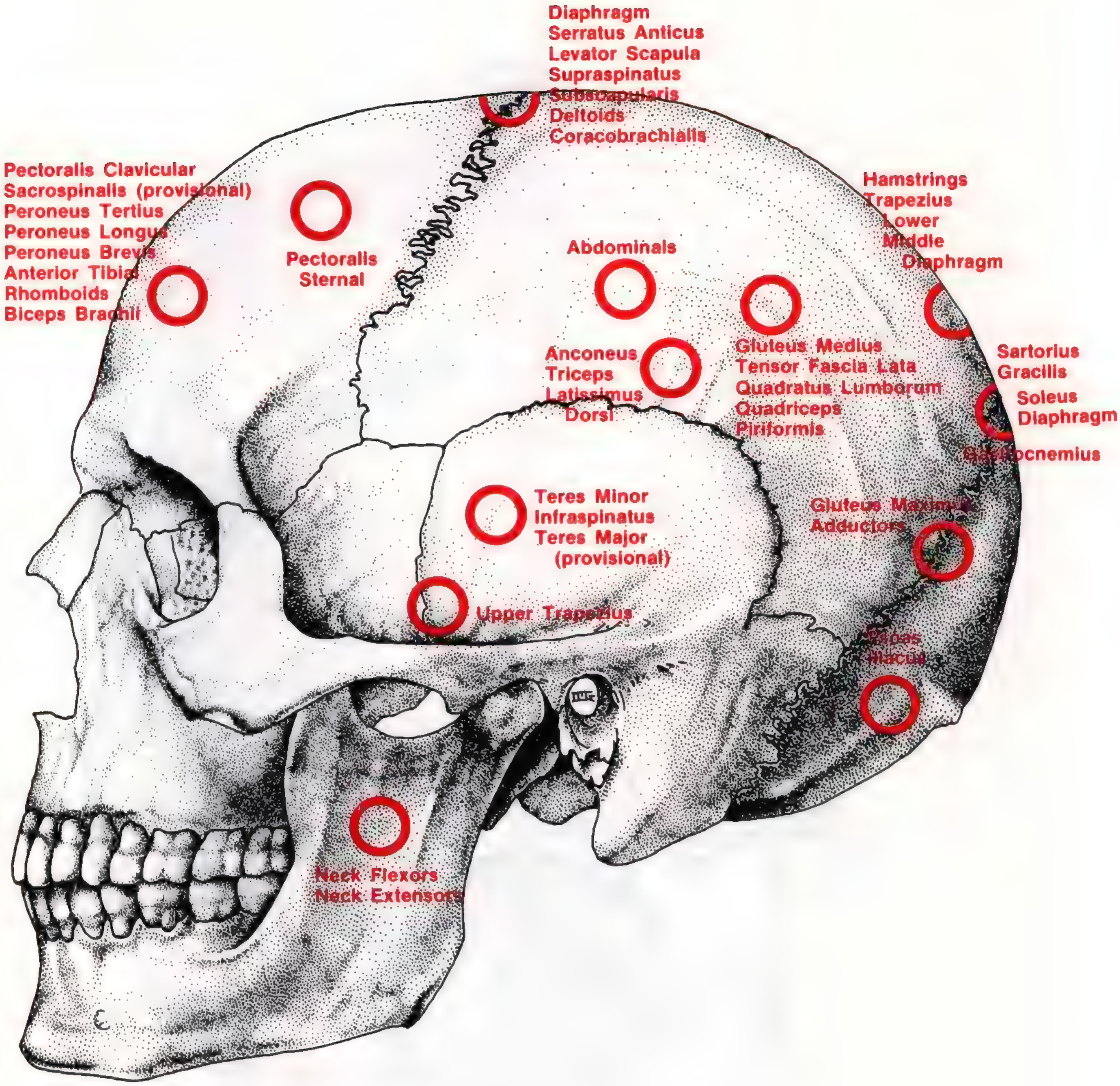
Occasionally when using biofeedback thermal monitoring there is a reaction opposite to that desired. If the temperature begins to drop when a neurovascular reflex is treated, clinical experience indicates that there is some other factor which needs to be cleared, such as a neurolymphatic reflex, structural fault, cranial primary respira-



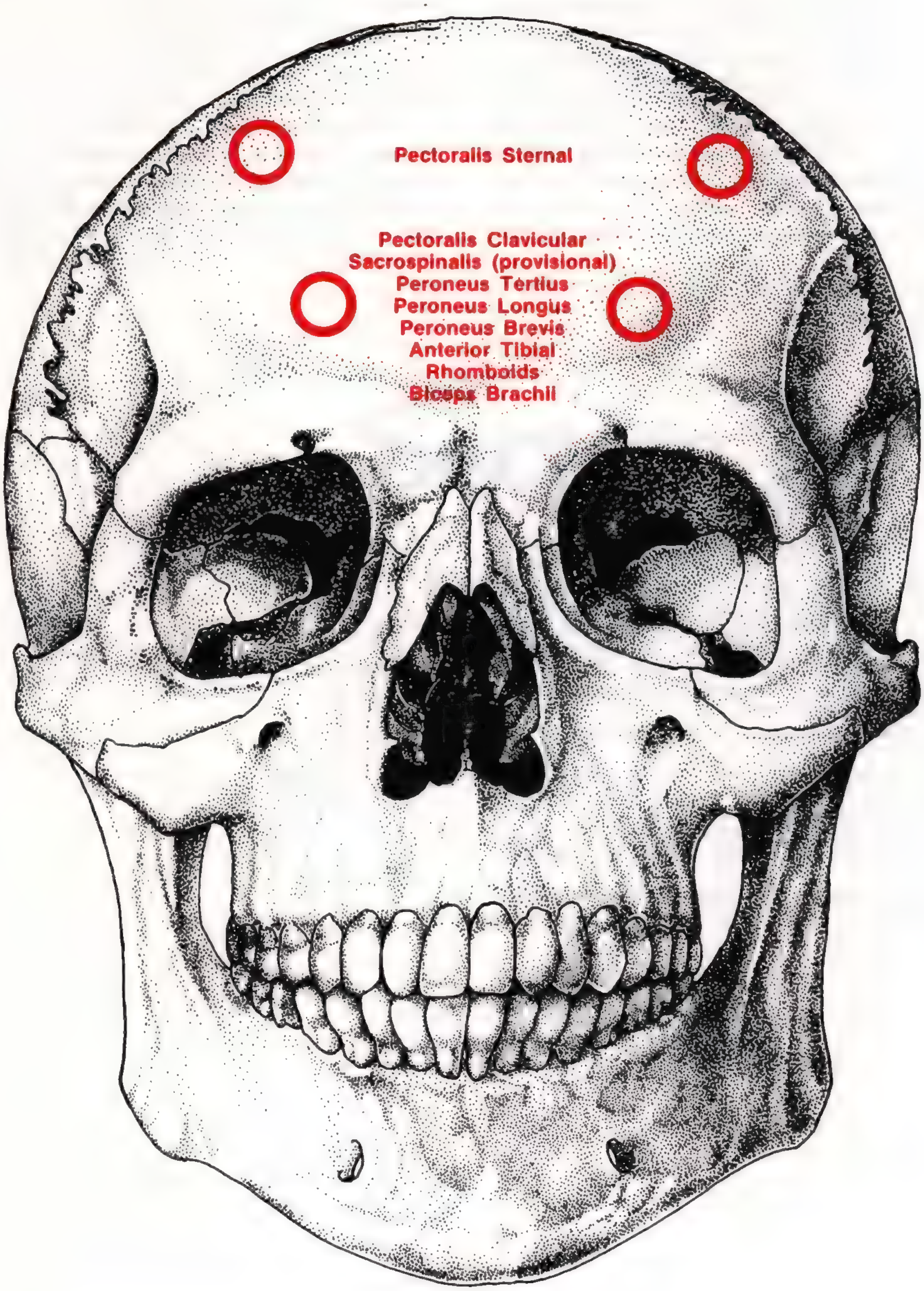
14—2. Superior view.



14—3. Posterior view.



14—4. *Lateral view.*



14—5. Anterior view.

tory dysfunction, or a nutritional deficiency. When this aspect is cleared, neurovascular reflex treatment will cause a favorable increase in thermal activity.

Therapy localization can generally indicate the length of time a reflex needs to be held. If the reflex has not been treated long enough, positive therapy localization will continue, as revealed when a previously strong indicator muscle weakens. In most cases, twenty to thirty seconds is adequate for eliminating the positive reflex; in others, it may be necessary to hold the reflex for five minutes, or even more in severe problems. It is important that the reflex be completely abolished. Failure to do so causes it to return and in some instances seems to aggravate the condition.

Like other reflex treatments used in applied kinesiology, the treatment of a neurovascular reflex should be a lasting correction unless other factors involved with the condition are not treated. If the positive neurovascular reflex returns, further investigation should be done to determine other factors involved with the condition. After successfully treating a neurovascular reflex, the muscle(s) which was weak with the association should now test normal on manual muscle testing.

This short description of the use of Bennett's reflexes, as adapted and used in applied kinesiology, by no means covers his teachings. His work is being taught under the auspices of the Council on Diagnosis and Internal Disorders of the American Chiropractic Association. This is mentioned for those who wish to delve deeper into his work.

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Section II

Muscle Testing

Chapter 15

The Science and Art of Manual Muscle Testing

Applied kinesiology has enjoyed a very rapid growth in the number of doctors using the examination system since its introduction to the scientific community in 1964 by George Goodheart, Jr., D.C.[13] Dramatic changes can be made in muscle integrity by using the various treatment techniques available to the natural healing arts, bringing muscular imbalances of the body back to normal.

Manual muscle testing has been used for structural and neurologic evaluation since the early 1900s. Recent texts about the subject[8, 12, 22, 23, 28] offer considerable information on the art and science of manual muscle testing. Specific procedures are described which are continually being improved as electromyography provides more evidence about the prime action of muscles.

In addition to the expertise of those who have developed manual muscle testing over the years, there has been an effort in applied kinesiology to improve procedures.[41, 47] Still, the greatest potential weakness in applied kinesiology — the Achilles heel — is quality muscle testing. A great degree of accuracy and reproducibility appears to be present in manual muscle testing when done by individuals knowledgeable in the science and proficient in its art. Scopp[42] evaluated the reproducibility of manual muscle testing using a hand-held dynamometer, with six trained examiners testing ten naive subjects. Pearson product-moment correlation between examiners was .91, suggesting that muscle testing is reliable between examiners.

Although manual muscle testing is a reliable indicator of muscle function when done properly, it is obvious that this diagnostic tool is no better than the practitioner performing the test. It can be compared with a time-honored diagnostic tool, the stethoscope, which is no better than what is between the earpieces. A stethoscope in the hands of a poorly trained individual, who is deficient in both the science and art of its use, will consistently give erroneous information, jeopardizing the patient's health and damaging the examiner's reputation.

The applied kinesiologist must study and master the science of manual muscle testing, as well as constantly practice its art. He must also have the ability to evaluate the muscle testing performed by others. This is necessary because many developers of therapeutic techniques have adopted manual muscle testing as a parameter of evaluation. This adoption is very realistic because of applied kinesiology's ability to work with any therapeutic technique. The proficient applied kinesiologist has the ability to evaluate the quality of other operators' muscle testing. This makes it easier to assess techniques being presented from the lecture platform by enthusiastic new developers. Certainly it is not expected that the developer of any new technique is perpetrating erroneous muscle testing to promote his idea. However, it has been observed by many advanced and technically proficient applied kinesiologists that much erroneous muscle testing is being done by those inadequately trained and lacking in practical experience.

This author believes the errors in muscle testing, by both practitioners and enthusiastic promotors of new techniques, are nearly always made on a subconscious level and repeated time after time. As we proceed with the discussion of the science and art of manual muscle testing, we will observe that many very slight changes in muscle testing can dramatically alter the results of the test. These subtle changes are frequently done on the subconscious level.

Mental Attitude

One of the first considerations which must be made in muscle testing is the doctor's mental attitude. The correct attitude is to accurately test a muscle without concern for the outcome of the procedure.

Keeping this thought in mind, it becomes obvious that when we are trying to prove to a patient he has a specific condition, the enthusiasm for that "educational information" being imparted to the patient may, on a subconscious level, alter the results of the test. The doctor may change his testing procedure slightly by moving his body, directing force in a different manner, or making any one of numerous parameter changes we will discuss. The doctor's mental attitude also enters the testing procedure when he believes very strongly in some specific "principle," such as white sugar being detrimental to everyone. Under these circumstances, muscle test findings will probably always indicate a weakening of the muscle when the individual ingests white sugar. Actually, white sugar is not detrimental to all individuals. The trained and artfully proficient muscle tester will be able to observe the error or change of parameter causing erroneous information to be derived from the muscle test. If white sugar weakens every tested individual, the operator doing the testing needs to re-evaluate his procedures. This type of muscle testing error is frequently called "operator prejudice," which adequately describes the reason for the error. Prejudice in this case indicates pre-judgement without regard for the outcome of the test.[50] An excellent indication that operator prejudice is not present is that periodically the examiner is surprised at the outcome of the testing procedure. Constantly finding a muscle to be weak or strong as expected is again an indication that procedures should be re-evaluated. The examiner who maintains the attitude that he is asking a question of the nervous system (or other energy pattern) when he is testing a muscle, and is interested only in accurate information from that testing procedure, is in a position to consistently obtain accurate information.

Science and Art

Whether initially learning the process of muscle testing, or improving already developed expertise in muscle testing, there are two primary areas of endeavor. First, there must be an accurate knowledge of the science of muscle testing. This includes the anatomy and physiology of the muscle being tested, and also of joint movements and other muscles which play a role in the testing procedure. Any peculiarities of the patient being tested, such as joint pathology, should also be known. Much information is gained about the particular muscle to be tested prior to testing its strength. This includes such factors as how the patient moves into the testing position; movement as the patient attempts to hold the testing position; observation of the muscle; ability to best isolate the muscle, etc. The doctor knowledgeable in muscle testing probably gains as much information from observation as he does from the actual forceful muscle testing. Knowledge of the subtle movements the patient makes and what they mean is a significant part of the science of muscle testing.

The second aspect is the art of muscle testing. The only way this can be acquired is by practice, keeping uppermost in mind the potential of operator prejudice. Practice includes not only learning to observe the scientific information of the muscle activity, as mentioned above, but also the mechanical aspects and the feel of the muscle testing procedure. The examiner will encounter many types of patients who require a modified approach to manual muscle testing. There will be the usual young to middle-aged individual who is the average patient for muscle testing. There are also the very young, the infirm, those with joint pathology or pain, and the patient trained in weight lifting. All require a different approach.

An excellent method to initially learn muscle testing or to improve technique is concentration on one muscle at a time. Pick one muscle to test on every patient who comes in throughout a day. On that day, prior to taking care of patients, study the anatomy, postural factors, synergist muscles which can be recruited by the patient to assist the prime mover being tested, motions the patient makes to assist a weak muscle, and all aspects on the scientific side of muscle testing. Throughout that day of testing a specific muscle, many types of patients will be seen and the art of muscle testing will develop. Even in a busy practice this takes very little time, and over a relatively short period it can improve the technique of even a good muscle tester.

Accurate manual muscle testing requires many facets of knowledge in the science, and considerable practice in the art, to become proficient. The learning process of muscle testing can be compared with that of learning palpation. To accurately palpate structures, an examiner must be knowledgeable about the anatomy of the structure he is palpating, and he must have developed the art of touch, distinguishing the characteristic changes between different types of tissues. All physicians who have been in practice for some time remember that the first time they attempted to palpate deep structure the body felt like a big hunk of meat, with only major structures being distinguishable. As the years passed, the structures seemed to jump out and become more distinguishable. As the science and art became still more familiar, abnormal structures were easy to distinguish from normal ones. This same rapid distinction of the abnormal and the normal is apparent to the proficient manual muscle tester. The abnormal movements of the patient attempting to substitute other muscles for the

prime mover, the inability of the muscle to "lock" properly, the feel of the patient's excessive pressure against the stabilizing hand, timing factors of the patient's resistance, etc., all give clues to the proficient muscle tester, in addition to the actual strength of the muscle against testing pressure.

Quantitated Muscle Testing

Much effort has been extended toward developing equipment to quantify the actual power of a muscle. The Cybex II dynamometer[11] has been used by several investigators to evaluate muscle strength.[6, 30, 33, 35, 43] The parameters being evaluated by the Cybex II and by manual muscle testing are different, and the evaluation of the "strength" of muscle function is different between the two systems. The Cybex II is evaluating muscle strength as the muscle generates power in a concentric contraction, called an isokinetic contraction by those using the Cybex. This dynamometer can also test power generated by a muscle or muscle group when in isometric contraction against the force arm of the unit. Manual muscle testing evaluates the muscle's activity when it is in isometric contraction and then overpowered to change to eccentric contraction. There is a lack of correlation of manual muscle testing findings and those of the Cybex II and other dynamometers. This has been observed in our laboratory[6] and by others.[33, 35] Rybeck and Swenson,[40] using another type of dynamometer, also observed the same.

In our laboratory we have modified the Cybex II in such a way that it is more applicable to applied kinesiology muscle testing. Our effort has been toward improved positioning for better muscle isolation, giving the prime mover better advantage, rather than general testing of muscle groups. This effort has, to a certain extent, been rewarding; however, before comprehensive papers can be written on information derived from this equipment, numerous questions must be answered. The equipment simply does not reveal much of the information available to the expert manual muscle tester. The equipment cannot see the patient move for recruitment of synergistic muscles. It cannot feel the muscle going out of an isometric contraction into an eccentric contraction. It cannot observe the timing factor in

15—1. Modified Cybex II dynamometer designed for applied kinesiology research.

muscle testing, and it cannot observe pressure against stabilization. In an effort to overcome some of the deficiencies of muscle strength measurement equipment, we have added electromyography to our laboratory; it has shown some evidence of a change in the timing factor of the muscle motor activity when a strong muscle is contracting as compared to a weak one.

The timing factor of muscle strength as observed on manual muscle testing has been observed on electromyography by Triano and Davis.[45, 46] There was a delay in motor unit firing when a muscle tested weak during applied kinesiology's reactive muscle test. Further evidence of a timing factor in manual muscle testing has been demonstrated by Nicholas et al.[34] Using an electromechanical sensing device and strip recorder, they correlated seven variables involving force and time and found statistically that the duration of the tester's effort, multiplied by the average applied force, was the factor which most influenced the examiner's perception of muscle strength.

We have also installed closed-circuit television recording in our laboratory, which simultaneously records the strip graph of muscle strength, electromyography, and other parameters, and also records a picture of the patient doing the test. This provides an opportunity for reviewing the graphed information, while at the same time observing the patient for body position changes for recruitment. Although this investigation is still in its early stages, it promises to reveal new information regarding the data obtained from manual muscle testing and the application of therapeutic measures to change muscle strength.

Several persons have developed hand-held dynamometers to record the pressure exerted against a muscle in isometric contraction as it goes into eccentric contraction. These hand-held strain gauges are fraught with many of the same problems that standard manual muscle testing faces. The timing of the test, as well as the angle of pressure, is variable. The patient's ability to shift slightly for recruitment or substitution is always present. Patient stabilization has the same variables, and on and on. The hand-held strain gauge introduces additional problems into muscle testing that the proficient manual muscle tester does not have. Regardless of the design of the hand-held transducer to this date, it is difficult for the operator to hold it effectively between his hand and the point to be pressed against for the muscle test. Some designs are better than others; however, all introduce the additional factor to be manipulated and generally managed by the operator.

More and more investigators are working with different methods of evaluating muscle strength on a strictly objective basis. Undoubtedly as expertise continues to develop in this field, new information will be learned about muscle testing procedures and the physiological changes that cause muscles to be strong or weak under different circumstances. As we work with these additional evaluation methods, it seems obvious that manual muscle testing will maintain its predominance in the near future as both a research tool and, certainly, as a clinical expedient for muscle testing in the daily care of patients. Every individual using muscle testing should dedicate himself to developing the maximum level of expertise in both the science and art of manual muscle testing.

FACILITIES FOR MUSCLE TESTING

As with any other tool, manual muscle testing must be performed in an environment conducive to obtaining accurate results. An important factor is the table used as an examination support.

The first consideration is the padding on the table. A soft table does not give adequate support and makes testing specific muscles very difficult. In some tests it is important to prevent the patient from rotating, such as in the psoas test. Soft cushions allow the buttocks to rotate from lack of posterior support. With pelvic rotation, the adductors become much more synergistic, changing the parameters of the test. On the other hand, a table which is too hard can cause the patient pain, again yielding inaccurate test results because the patient fails to fully contract in the presence of pain. When doing a hamstring test in the prone position on a hard table, there is great chance of jamming the patella into the hard table, causing pain to the patient. Obviously the patient will let go of the muscle contraction rather than allow the pain to continue. A quadriceps test done in the seated position over the sharp edge of a table will cause the table to cut into the hamstring tendons, again causing pain to the patient.

The table should be wide enough to allow the patient to have his hands lying loosely at his sides, whether in the prone or supine position. The patient's hands lying randomly on the body can influence the test by accidentally stimulating active reflex points on the body's surface. The width of the table is also important in giving the patient confidence in the procedure without fear of falling. Tests done in the

side-lying position on a very narrow table can make the patient more concerned about falling than with the procedures being accomplished. Concern about falling can also be a factor in tests such as the oblique abdominals, where the patient is being tested in a seated position and then goes to a lying position with rotation as a factor.

The patient should be unclothed to a reasonable degree so that the skin over the muscle being tested, as well as over the synergists, fixators, and antagonists, can be observed. The gown used for female patients should be adequate to provide a degree of modesty so the patient is not mentally influencing the test because of concern with appearance, thus failing to concentrate on the testing procedures. This is especially important in tests such as the sartorius, adductors, gluteus medius, etc.

The patient's clothing or gown should also be loose enough so that the patient can easily therapy localize to most areas directly on the skin. Clothing should not be so tight that it encumbers movement during testing procedures.

Jewelry should be removed for accuracy in testing. The metal, various stones, etc., may influence the tests, especially through the meridian system. Of course, if the patient always wears the jewelry, that factor should be taken into consideration.

The environment and equipment should also be comfortable for both the patient and the examiner. A table of the correct height, preferably one that elevates, should be provided. A table at improper height not only creates leverage problems for the examiner, but may also put the patient at a height that is fatiguing to the examiner. Muscle testing, even in a full day of very active practice, is not fatiguing to the examiner if the testing is done properly.

PATIENT FACTORS WHICH WILL INFLUENCE THE TEST AND GIVE INACCURATE RESULTS

Muscle testing is intended to evaluate the nervous system and other physiological parameters which influence the strength of the muscle. There are numerous factors of which the examiner must be aware that can cause muscle weakness or strength when it is not the true status of the system; thus erroneous data results. Most of the time the examiner will be aware of these potential problems through proper questioning during consultation and tests done early in the examination procedure.

Medications may influence the body by altering the function of the nervous system. Since many medications work through the nervous system, it should be obvious that a patient who is on this type of treatment may display erroneous information on evaluation of the nervous system through muscle testing, or for that matter any other mode of testing the nervous system. Medications which appear to be especially problematic are tranquilizers, antidepressants, birth control medications, diuretics, and asthma medications.

A joint involved in the muscle test must function normally to obtain accurate results. If abnormal, this factor must be taken into consideration in evaluating the procedure. A painful joint involved in the test will often cause the patient to yield rather than allow the testing procedure to increase pain. This same basic principle is also applicable if the examiner himself is creating pain by inappropriate testing procedures. It is a normal, natural reaction of the individual being tested to discontinue muscle contraction when a procedure is painful. Furthermore, the joint must have normal range of motion, or the examiner must consider the abnormality in evaluating the testing procedure. In questionable cases, take the joint passively through its range of motion. It is often of value to have x-ray and other diagnostic procedures done on the questionable articulation.

When the examiner's contact for muscle testing is over an articulation, or one intervenes between the contact point and the muscle being tested, possible joint abnormality must be considered. It is possible to have a subluxation of the articulation; the pressure being applied for the purpose of muscle testing is actually challenging the articulation, causing a weakness which would not be present if the joint were not involved. If joint involvement is suspected, it should be challenged and/or therapy localized to determine if it may be affecting the testing procedure.

The examiner's contact at the wrist should be well away from the radial artery where the pulse is generally taken. This is the location of the "meridian pulse points" which can be accidentally therapy localized by the examiner, thus giving erroneous information. Meridian points are unusual because they therapy localize from the examiner's touch, as well as the patient's.

Metabolic imbalances in the patient will sometimes systemically alter the information obtained from muscle testing. The patient with a frank or relative hypocalcemia will sometimes develop muscle cramps, causing the muscle to appear weak when

actually it is not. General malnutrition, as well as dehydration, gives general muscle weakness throughout the body; this does not reflect the activity of the nervous system, but rather that of the metabolic state. Although these metabolic problems cause inability to get accurate individualized information from manual muscle testing, they do give the examiner information about the individual's health status which needs correction to obtain the highest plateau of health.

Muscle testing obviously requires the patient's cooperation. For the patient to be capable of cooperating, he must have a thorough understanding of the muscle test procedure. Once the patient understands the principles of muscle testing, little further education is necessary. The patient should understand specific instructions for the different tests, such as "don't bend your elbow, keep the knees straight, resist as hard as you can," etc.

Along with understanding the test, the patient must have consistent motivation to perform the test. The examiner can unconsciously give the patient more motivation to perform the muscle contraction. This is especially true after a treatment procedure has been performed. It is sometimes of value to repeat a test, giving the patient additional motivation by stating, "Contract as hard as you can and let's see if that's not stronger than it appears." This is valuable during the evaluation phase prior to treatment. Continually evaluate the patient's motivation to perform the test.

Neurologic disorganization within the patient can produce information which appears random in nature. In the early days of applied kinesiology, this randomness was observed in patients who had muscle weakness which did not correlate with other factors of the examination and was generally confused in nature. The term "switching" was applied to this neurologic disorganization. Many examination procedures have been developed in applied kinesiology to determine when the patient is switched, or neurologically disorganized. Every patient should be evaluated for the possibility of switching prior to major examination. Before muscle testing information can be applied to specific conditions, the patient must be neurologically organized by the various therapeutic measures which have been developed (see Chapters 8 and 9 for further discussion).

The patient's hands should always be placed away from the body. Therapy localization, which is the placing of the patient's hands on specific areas of the body to stimulate nerve endings and other factors, may change the results of a muscle test. Early in applied kinesiology before these factors were known, the patient could have his hands placed randomly on the body, causing muscle strength changes which were observed by the examiner; however, the reason for the strength change was unknown. This randomness of test results was an enigma which caused a considerable amount of confusion. Testing a muscle with nothing being done to influence either its strength or weakness is called testing the muscle "in the clear." The examiner should constantly observe the location of the patient's hands, keeping them off the body when it is intended that the patient be tested in the clear.

Continued testing of an individual while looking for an abnormality can possibly fatigue the patient's muscle. Thus the examiner may conclude that an additional parameter to the test is positive when it is not. It is easy to determine whether or not fatigue is a factor in test results when a muscle weakens from some additional factor placed into the test. When the muscle weakens, simply reverse the additional factor to determine if the muscle regains its original strength. A fatigued muscle will obviously not immediately regain its strength; it will remain weak until it is rested.

The Science of Manual Muscle Testing

To apply the science of manual muscle testing, the examiner must have knowledge of the anatomy of the muscles involved in the test, the tendon attachments, the actions of the muscles, and the physiology of muscle contraction. Applying this knowledge, he can observe the patient's attempts to recruit other muscles to substitute for the prime mover being tested. The examiner must have knowledge of the stabilization necessary for the patient to be able to use the prime mover to the best advantage. Furthermore, he must know the dynamics of his own body and how they influence the evaluation of the muscle strength exhibited by the patient.

First, it is important to isolate the specific muscle for testing as well as possible. When referring to isolation, it must be understood that it is impossible to completely isolate a muscle for testing, with only a few exceptions. In most instances, the structure is placed in a position that gives a specific muscle the best advantage to be the prime mover in the activity.

As we will see later, the basic fact that muscles cannot generally be isolated gives the experienced muscle tester a considerable amount of information about muscle strength from observing the patient's activity as the test is performed.

Testing specific muscles gives experienced examiners the ability to obtain excellent reproducibility in muscle testing. Generalized tests, such as the "arm pull-down test" or the "leg test" are of groups of muscles; they are not specific muscle tests. They should be reserved only for tests requiring group evaluations, such as the gait mechanism. Unfortunately, these general tests have been used by many who are not knowledgeable in the science and art of manual muscle testing. These generalized testing procedures have been used to promote various techniques, such as generalized testing for nutrition, and — worst of all — as parlor tricks. These procedures are condemned because they have a low level of reproducibility, regardless of the examiner's experience. In the arm pull-down test, a slight change in the vector of force appears to change the test, consequently affecting the strength perceived. Stabilization of the scapula, function of the shoulder girdle, general stabilization of the standing or sitting patient, and the multiplicity of muscles involved must all be taken into consideration in these greatly variable tests.

15—2. The arm pull-down test, which is highly inaccurate.

There are four muscle categories which must be understood and evaluated in any specific manual muscle test. The **prime mover** is the muscle being tested; the starting position of the test is one that gives greatest isolation and opportunity for that muscle to be the major factor in performing the procedure. **Synergist muscles** are those anatomically situated to aid the prime mover. With slight change of testing position or of movement, they can be recruited to aid the prime mover to a greater extent. In most instances, the synergist muscles are active in the testing of the prime mover; however, the object is to place them at a disadvantage so they are not a major factor in the test. The **fixator muscles** are those responsible for stabilizing the part or parts being tested. Fixator muscles are not a factor in all muscle tests, but when present they are extremely important in evaluating the outcome. Fixator muscles are sometimes located between the point of the prime mover muscle and the point of force being applied to test the muscle. An illustration of this is the necessity of normal deltoid function when the arm is being used as a lever to test the ability of the serratus anticus to hold the scapula. In other instances, the fixator is located distal to the point of muscle activity and the point of force being applied. An example of this is the reverse of the previous example; the serratus anticus must be capable of stabilizing the scapula when the deltoid is being tested. The **antagonist muscle** is usually not a factor in a routine muscle test because of reciprocal inhibition. It can be a factor in unusual situations or in specialized procedures in applied kinesiology, such as reactive muscle testing.

In order to evaluate the prime mover, synergists, fixators, and antagonists, the examiner must have a high degree of anatomical knowledge. First, the exact origin and insertion of each muscle is important. This ties in with the knowledge of the muscle's action. Additional information in muscle evaluation can be obtained by palpating for tenderness and nodules at these locations. The tendon gives considerable information, especially on those muscles having long tendons which stand out during the muscle test. For example, it is easy for the experienced muscle tester to obtain excellent isolation of the peroneus longus and brevis by observing maximum tension on those tendons and minimum tension on the tendons of the peroneus tertius and extensor digitorum longus. Knowing the location of the tendons and muscle belly also gives the examiner the ability to palpate these structures for contraction during the test.

The examiner must thoroughly understand the muscle test. Sometimes a muscle test is misinterpreted because of failure to observe what the prime mover is actually doing. An example of this is the serratus anticus test, which uses the arm as a lever to

move the scapula while the examiner's thumb lifts on the angle of the scapula. If the serratus anticus muscle is weak, the scapula is not being stabilized and the arm will come down easily. The test, however, is actually whether the scapula moves, not whether the arm comes down. The test requires an intact shoulder, and the arm is used only as a lever to direct force into the scapula. Another test with a similar observation is the popliteus test. The examiner exerts force on the foot to rotate the tibia on the femur. Whether the foot turns around is insignificant; the actual test is the movement of the tibia on the femur as observed by movement of the tibial tubercle. The examiner cannot evaluate this test unless he is observing the tibial movement.

Knowledge of the action of all the muscles involved in the test is absolutely mandatory. Where the prime mover's major action may be flexion of an articulation, the slight amount of rotation that the prime mover imparts on the articulation is of value in determining the exact starting position for the test. Just as important — and possibly even more so — is the action of the synergist muscles. This knowledge enables the examiner to know when the patient is recruiting synergist muscles to support the action of the prime mover. Synergist muscles being used more than they should can often be observed when the patient is placed into the starting position for the test. The examiner places the extremity into the position and requests that the patient hold that position. In the presence of muscle weakness, the patient will often attempt to shift his body so that a synergist muscle can take over the function which should be accomplished by the prime mover. This shift in position is maintained during the active process of the test if the examiner is not acutely aware of the activity, developed subconsciously by the patient. The patient knows he is to resist the examiner's force, and his body is beautifully designed to have supplemental activity when a specific muscle is weak for one reason or another.

Many observations of the body language of muscle weakness are made by the experienced examiner during muscle tests. For example, the prone patient, attempting to hold the thigh in extension with a weakened gluteus maximus contraction, will either roll the body to elevate the hip on that side, or extend the knee to lengthen the hamstrings, bringing them more into the action. The patient with weak peroneus longus and brevis muscles will attempt to dorsiflex the toes and ankle during the test. This is because the tendons of the peroneus longus and brevis are behind the lateral malleolus, giving plantar extension, whereas the synergist tendons are in front, giving dorsiflexion. Dorsiflexion in the peroneus longus and brevis test therefore gives a clue that there is weakness of the muscles. It is good to remember that the cooperating patient will always attempt subconsciously to use full muscle strength, even though it is not the muscle that the examiner is attempting to isolate as the prime mover.

Knowledge of the anatomy involved gives the examiner further ability to make observations visually and by palpation. Individual muscle involvement should be distinguished from that which is systemic. Systemic information can be obtained by recognition of the manner in which general muscles contract and relax. The patient with a relative hypocalcemia will have muscle cramping, or, on a more subclinical level, a failure of the muscle to relax in a normal manner. Failure of the muscle to relax, along with other upper motor neuron signs, can indicate pathology of the central nervous system. Palpation of the muscle for atrophy and failure to change muscle strength with the usual therapeutic procedures used in applied kinesiology can uncover nerve damage, which should be evaluated further by usual neurological testing procedures.

Proper stabilization of the patient is absolutely mandatory to obtain accurate information from muscle testing. Stabilization procedures are considered individually for each muscle to be tested. A generalization of stabilization principles is presented here. In addition to the knowledge of anatomy and action of the fixator muscles, the examiner must consider the stabilization of the patient provided by the table and by his own technique. As mentioned before, the table should have proper padding, being neither too soft nor too hard. The table surface should be such that the patient does not slide easily, as sometimes happens when the table is covered with paper, which is usual on standard examination tables. It is usually permitted — and sometimes required — that the patient use his arms and hands to stabilize the trunk against the table. This will vary with different patients because of body weight, increased or decreased friction of the trunk with the table, and which muscle(s) is being tested.

The examiner must provide adequate stabilization in such a manner that the patient experiences no pain. The examiner may cause pain when he stabilizes over a bony prominence, such as the anterior superior iliac spine in either the psoas or pectoralis major (sternal division) test. This tendency to cause pain on stabilization is even greater when the muscle being tested is weak, because the patient will tend to rotate his body to bring synergists into the contraction of the test.

Additional stabilization factors become involved when there are rotation tests in which the examiner must apply counter-pressure. These are tests where an extremity is used to provide leverage in testing a

muscle which gives rotation to the extremity. An example is the teres minor test, where the elbow is flexed to 90° and internal rotation is imparted to the upper arm, testing the rotational capability of the teres minor. The examiner must stabilize the elbow and concomitantly observe that the patient does not abduct, flex, or extend the shoulder, or flex or extend the elbow.

15—3. The examiner's hand stabilizing over the anterior superior iliac spine can cause pain and, consequently, inaccurate results.

When the patient is in a seated or standing position, stabilization becomes much more difficult. The trunk is in a position to move in any direction, giving the patient the capability of adding additional muscles to the actual synergists of the test, which complicates the evaluation procedure. For example, the patient can laterally flex the trunk away from the side of a deltoid test, keeping the elbow at the same height but actually allowing the shoulder to adduct. In this same test, he also has the ability to hike the shoulder up with the upper trapezius and levator scapula, showing no lateral trunk deviation but still influencing the test, making the evaluation difficult for an untrained examiner.

The standing or seated position also places additional parameters into the test which may change the strength of the muscle being tested, although the muscle itself is not actually weak. For example, there may be a foot problem which stimulates the proprioceptors to send information to the latissimus dorsi to inhibit the muscle, causing it to test weak. This could be interpreted to mean that the latissimus dorsi is weak, when in fact the actual problem is in the foot; erroneous information correlated with the gait mechanism is being transmitted by the nervous system. Again we see how a valuable tool such as muscle testing is no better than the operator performing the test and making the evaluation.

Knowledge of the dynamics and kinesiologic factors of the examiner's own body in the muscle test is important. The actual application of this knowledge will be discussed further under the art of manual muscle testing. The examiner must understand the various leverage factors he has with his own body in applying force in a muscle test. These will be used differently with individual patients of varying strength and characteristics.

The examiner's contact point should be at the same location for comparative muscle tests on the same patient. The contact point may, however, be varied to give different amounts of leverage, depending upon the patient's strength. An older patient without good muscle tone requires a contact point giving less leverage and more advantage to the patient. For example, the contact point for the mid-trapezius test

15—4. Observe the patient's lateral body shift.

can be proximal to the elbow, whereas the contact for a very strong patient will be more distal toward the wrist, giving the advantage to the examiner. The leverage factor of the contact point should take into consideration additional articulations and muscles that may influence the testing procedure. In the above illustration the elbow, with the biceps and triceps, becomes a greater factor when the contact point is at the wrist than when the contact point is proximal to the elbow. Contact for the psoas muscle can be at the ankle or above the knee, again taking into consideration the patient's physical build and general strength.

15—5. Pectoralis major (sternal division) test being done correctly.

15—6. Two-finger contact can cause pain to the patient.

The type of contact the examiner makes with his hand gives considerable change to his perception of the test. Fingertip contact gives more perception of strength than does total hand contact, because of the greater abundance of nerve endings in both the fingertips and in the additional articulations involved. Fingertip contact is usually preferable because of the additional nerve input regarding the pressure exerted; however, on extremely strong patients or on strong muscle groups (such as the quadriceps), hand contact is preferable. When making fingertip contact, the doctor must be careful to use all the fingertips, spreading the pressure over a wider area. Sometimes a one- or two-finger contact at the wrist, such as in a pectoralis major (sternal division) muscle test, causes pain from the small contact over a bony area. The

15—7. Examiner shifts arm and forearm, using full hand contact. These changes limit comparative testing ability.

patient will yield rather than allow the pain to increase. This yielding may be considered as a weak muscle, when in fact it is not.

The examiner's shoulder, arm, and wrist should be held at the same angle for each comparative test. When the elbow or shoulder is flexed more for one test than another, there is a different relation of the examiner's shoulder and trunk muscles. Especially important are the triceps brachii and scapula fixators, making it difficult — if not impossible — to get accurate comparative results. Also, the sensory nerve endings of the doctor's joints and muscles are in a different perspective, again making the necessary comparison difficult.

The examiner's shoulders should be kept in the same plane each time a muscle is tested. When the shoulders shift, the examiner may be transferring his body weight into the muscle test. When a mixture of the examiner's muscle contraction and body weight is randomly introduced into the test, it is impossible to make comparative evaluation in muscle tests. There are occasions when additional body weight must be applied in order to test very strong individuals. These occasions often involve individuals with a weight-lifting background. On these occasions, the test should be performed with the shoulder plane and angle of the trunk the same each time, thus giving a measure of reproducibility to the test. The final decision of the patient's strength comes from the amount of force the examiner is adding to his body weight with his muscle contraction and neurologic perception in the hand.

Muscle testing is only a portion of the applied kinesiology examination. In order for it to be validat-

ed in the examination, the results must correlate with other signs and findings. The structural balance of the subject must correlate, as should the body language of weakness. Body language of weakness includes the positional changes the patient makes to aid the weakness by substituting synergistic muscles. For example, during a psoas test the patient may increase hip flexion or adduction to bring the rectus femoris or the adductors into the test. Nearly all tests have special considerations for evaluating synergistic activity. The examiner must understand these subtle changes in body movement to obtain full correlation of the examination procedures. Furthermore, there are predictable ways the body adapts to structural imbalances. In specific conditions, there should be a particular pattern of pain upon digital pressure, or symptomatically expressed by the patient.

The type of subluxation observed by palpation, challenge, swelling, x-ray, etc., is predictable with specific patterns of muscular weakness. The subluxation appears to develop as a result of weak muscles failing to support the articulation. When a subluxation is found in the body, all parameters of the evaluation should correlate, not just those observed by muscle testing.

These patterns are explained throughout applied kinesiology literature, as well as other patterns such as meridian imbalances, nutritional correlation, cranial-sacral primary respiratory system dysfunction, and general neurologic organization of the body. They must correlate in an examination. If the examiner does not find all factors correlating with his muscle testing, he should evaluate the patient for neurologic disorganization. If the patient is found to be neurologically disorganized, correction should cause all factors of the examination to now correlate. Muscle testing is only one piece of the giant puzzle.

The Art of Manual Muscle Testing

In comparing the science and the art of manual muscle testing, major emphasis must be applied to the scientific aspect. This is simply because the preponderance of information comes from the examiner's knowledge of the anatomy and physiology of the actions of the prime mover, synergists, fixators, and antagonists, as well as knowledge of proper stabilization and function of his own body in the muscle test. Art can only be developed when there is thorough knowledge of the scientific aspect of muscle testing. Obviously art is developed through a considerable amount of practice. Practice must be applied to testing muscles of normal and abnormal subjects, and people with different body types and backgrounds. This practice develops the feel for the amount of pressure to exert during muscle testing, and for the body position the examiner desires to get accurate information without fatigue to himself.

The different types of patients the examiner will encounter must be considered. The most difficult testing is of the infirm, or the patient with pain or joint pathology. The infirm individual requires great discrimination, using mild amounts of pressure in testing. Fingertip contact with a small amount of leverage is mandatory. The examiner may not be able to directly test the patient who has pain or joint pathology in the area of involvement. There are many procedures in applied kinesiology which give ability to indirectly test the structure; these are discussed with the various conditions.

Another classification of patient who is difficult to test is the very strong individual who often has a weight-lifting background. These people have tremendous ability to recruit synergistic muscles when there is a weakness. This is especially true of the weight lifter, as he has trained his body to get the maximum amount of power in different movements. His training emphasizes that all muscles involved in the power production must be activated. These individuals become much easier to test as the examiner becomes more experienced in placing the subject in a testing position and maintaining that position with adequate stabilization. Stabilization is the most difficult part of testing a very strong individual.

The most important factor in accurate muscle testing is reproducibility of the test. This is especially important when the testing procedure is being used as a "before" and "after" evaluation of the treatment technique. Without reproducibility, it is obviously impossible to make comparative tests before and after treatment. In order to have reproducibility, the examiner must develop muscle testing habit patterns so that his body is automatically in the same position for the test. As mentioned, the body position will vary, depending upon the type of patient being tested. Even the experienced muscle tester should periodically evaluate the starting point, direction of force, contact point, wrist-elbow-shoulder position, and shoulder plane and trunk angle to determine that they are habitually in the same position for repeated

muscle tests on a patient. Consciously develop these habit patterns to reproduce body positions in muscle testing.

Judging the amount of pressure exerted during a muscle test is obviously an art in muscle testing. It takes a vast amount of experience to be able to discriminately judge varying degrees of pressure exerted in testing a muscle. Unfortunately, this judgement is not just whether the muscle is strong or weak; there is an infinite variability from extremely strong muscles to those in total paralysis. In making a judgement of pressure, the speed of force applied to the patient should be uniform with each muscle test, giving the patient adequate time to contract against the force. As previously mentioned, it has been observed by use of the Cybex II dynamometer and electromyography that one of the factors involved in the change of muscle strength, as observed on manual muscle testing, is a timing factor of motor unit recruitment within the muscle. In a muscle that tests weak when it is forced from maximum isometric to eccentric contraction, it seems there is a delay of the motor units. A manual muscle tester must always apply pressure at a constant speed, not more quickly one time than another. This requires a considerable amount of expertise on the examiner's part. Unfortunately, even the patient being examined cannot usually observe the change in speed of pressure during the muscle test. Both the well-meaning doctor and the patient can easily be fooled by slight changes of technique during manual muscle testing.

The muscle test consists of observing the muscle's isometric contraction capability while the examiner increases the testing pressure to the point that the muscle goes into an eccentric contraction. Once the structure has started to move, the muscle test is essentially over. Applied kinesiology students are often led astray by well-meaning instructors who take a muscle completely through its range of motion to demonstrate its weakness. It must be understood that this activity — taking the muscle completely through an eccentric contraction — is not necessary, and is potentially harmful. It is fatiguing to the patient's muscle and to the doctor, and it may in some instances cause microtrauma in the muscle.

During clinical evaluation, it is often of value to re-test a muscle which appears to be weak, reassessing all the scientific and artful aspects of muscle testing. Make certain the patient has adequate time to contract, understands the procedure, and is fully motivated to execute the muscle test. The examiner should assess his own knowledge of the muscle test and make certain he is applying the art of muscle testing to his maximum ability.

Muscle testing has proven to be a valuable tool in the assessment of the nervous system, other energy patterns, and structural integrity. However, regardless of a tool's value, always keep in mind that the tool is only as good as its operator.

15—8. Psoas test done correctly.

15—9. Examiner throwing his weight into the test.

ASSESSMENT OF MUSCLE TESTING BY OTHER OPERATORS

Because muscle testing has been adopted by many individuals as "proof" of treatment techniques — especially those being introduced as new, philosophical concepts — it is important that each individual who will ultimately find himself in the audience of such a presentation consider applying the knowledge he has available about accurate muscle testing to evaluation of the lecturer and demonstrations. Since the observer does not have the ability to actually feel the pressure being exerted, he must apply his attention to the body language of the individual being tested and that of the examiner. Also, the technique of the muscle test should be evaluated.

Evaluating the technique of the test obviously requires that a specific muscle be tested. Even the most proficient manual muscle tester cannot get good reproducibility on an interexaminer basis using generalized muscle tests such as the arm pull-down and leg tests. This type of testing to evaluate therapeutic procedures, nutritional challenge, and other factors should be suspect immediately. The experienced muscle tester can ask himself many questions to help evaluate specific muscle tests done by others. Is the starting position the same with each test? Is there an obvious speed change during the muscle test? Does the examiner shift his own position? Is there adequate stabilization during the muscle test?

The experienced muscle tester can evaluate the patient's body language of strong or weak muscles if he is close enough to make the observation and the examiner is using standard muscle testing procedures. Factors to watch for can be stated in the form of questions. Does the patient have to shift his body to bring the part being tested into the starting position? After the part is placed in the starting position, does the patient automatically shift his body slightly to allow synergistic muscles to take over for the supposed prime mover? Is there an effort by the patient to bring other muscles into activity, thus changing the test? For example, when testing the sternocleidomastoid, does the patient try to turn his head toward the midline, thus recruiting synergistic action of the scalene muscle group?

The examiner's body language gives a considerable amount of information as to whether the muscle testing procedures are being done with finesse. When making comparative muscle tests, does the examiner consistently duplicate his positions, or does he throw body weight into the muscle test one time but not another? Does the examiner repeatedly use the same contact point? Is the leverage the same on repeated tests? Is the testing speed the same each time? And, finally (and most difficult to evaluate), is there a high degree of salesmanship in the presentation, possibly contributing to operator prejudice?

This section on evaluating muscle testing of others is not presented to discredit or in any way discourage those individuals using muscle testing as a clinical tool. It is presented to heighten awareness of the necessity for accurate muscle testing. Accurate use of this valuable diagnostic tool will enhance its future value, both to the chiropractic profession and to patients who are being and will be treated on the basis of the information derived from this evaluation system. The only way to use any tool to its maximum effectiveness is with an understanding of **how** to use it, what it is **not** designed for, and with a high degree of respect for what it **is** designed to do.

15—10. Tensor fascia lata test.

15—11. Patient bending knee, which changes the parameter of the test.

Format of Muscle Testing Section

There is a great deal of information throughout this section on muscle testing. The illustrations are designed to show proper muscle testing and also some common errors. The illustrated errors include those which the examiner makes, and also the patient's efforts to recruit synergistic muscle activity. Anatomical drawings are presented to give isolated views of the prime mover in action. Use these drawings to visualize the central line of the muscle fibers involved in the test. This will help improve the direction of applied force.

This is a brief summary of the format used in presenting each muscle. The chapters are grouped according to areas of the body, including the shoulder; elbow and hand; neck and trunk; pelvis to trunk and leg; and knee and foot. This is for convenience in studying sections of the body. An alphabetized quick reference index to the major discussion of a muscle will be found immediately after the text index.

Origin and Insertion of the muscles is given to refresh the veteran doctor in anatomy,[1, 10, 20, 21, 24, 25, 26, 28, 31, 38, 39, 48, 49] which he may not have reviewed for several years, and to give the student a concise, central area for studying during the development of his own science and art of muscle testing. This anatomy is important for accurate testing, and for the use of origin/insertion technique and proprioceptive technique for the treatment of muscles in applied kinesiology.

Muscle Action[1, 2, 8, 10, 20, 21, 24, 25, 26, 28, 29, 31, 44, 48, 49] is important for correlating with the direction of pressure applied when testing the prime mover. Subtleties of the action of the prime mover, such as slight rotation factors of the adductors, are important in positioning the part to be tested.

Reversed Origin and Insertion and Change of Action is given when there is a significant change in muscle activity as the insertion is stabilized and the origin becomes the movable part. This information is of value when testing the muscle in different positions, as well as when evaluating as a synergistic muscle to another prime mover. It also gives better understanding for postural and movement analysis.

Testing Position is the position into which the patient is guided or placed by the examiner before beginning the muscle test. The exact position is important, including the specific amount of abduction, adduction, flexion, extension, rotation, etc. Nearly all tests require a three-dimensional positioning, and all factors are important.

The testing position also becomes very important in certain tests which determine if the patient can hold the testing position once placed in it. The testing position is designed to be one where the prime mover is at a maximum advantage and the synergists are at a disadvantage. If the patient cannot hold the testing position and moves slightly into another position, the examiner should determine what synergists become more active in the new position. This is a good indication that the prime mover to be tested is probably weak. If the patient is asked to move from the adapted position into the testing position, an evaluation can be made of the ease with which this is accomplished, or if in fact it can be accomplished.

Patient Fixation Requirements. Many tests require effective stabilization of a body part by the patient's fixator muscles. For example, when testing most of the shoulder muscles, the scapula must be stabilized; e.g., the rhomboids stabilize the scapula toward the spine when the teres minor is tested. Another type of fixation is when an extremity is used as a lever to impart force for the muscle test. An example of this is the requirement for adequate deltoid strength to test the serratus anticus on the seated patient. When an extremity is used for a lever, there must be no joint pathology which could cause pain. In the serratus anticus test, if bursitis or other pathology causes pain in the shoulder, the test will be invalid.

Stabilization. There are several types of stabilization. One is provided by the patient's body weight; in some cases this is the major stabilization factor, such as in the sternocleidomastoid muscle test. In others, there may be a combination of the patient's weight with the friction of the body on the table's surface. In some cases, stabilization with the table may require that the patient hold the edge of the table.

Stabilization may be provided by the examiner. Consistent stabilization is extremely important for reproducing the results of a muscle test. This is very important in "before" and "after" treatment evaluation. The stabilization provided should be such that no pain is imparted to the patient by the stabilizing force. Occasionally it is necessary for an assistant to aid in stabilization.

Synergists. Knowledge of the synergistic muscles' activity with the prime mover being tested is possibly the most important information the examiner must have to accurately evaluate a muscle test. Most muscles cannot be totally isolated for testing. There will always be activity of the synergistic muscles with the prime mover, with the exception of the isolated tendon insertion on the distal phalanx of the toes and fingers.

The design of a muscle test is simply a combination of placing the part to be tested into position and directing a force which will give greatest advantage to the prime mover and less to the synergists. When the individual being tested moves into a position to give the synergists greater advantage, it is usually because the prime mover does not have the ability to function as efficiently as it should. Observation of an individual's movement to recruit synergistic muscles can give as much information — if not more — than the actual testing pressure.

Antagonists. The antagonist is not listed in the muscle testing section of this book unless it is important to the test. For example, the rectus femoris is important in the gluteus maximus test because considerable knee flexion is important; if it is not available because of a shortened antagonistic rectus femoris, there will not be adequate hip extension unless the knee is flexed less.

Test. [3, 8, 12, 13, 22, 23, 27, 28, 32, 36] The description of the test is the contact point and direction of pressure the examiner makes. It must be remembered in manual muscle testing that the test is actually a combination of all the factors presented here. The final evaluation of the test results depends upon the examiner's knowledge of the prime mover and its synergists, fixators, and antagonists. He must know what stabilization is necessary and be capable of providing it. As the patient is placed in the testing position, all of the involved muscles are evaluated; evaluation continues as the patient attempts to hold the starting position. Only with proper preparation in every area is the examiner ready to apply the actual test pressure. Even then continued awareness is necessary so that pressure is directed at the same point consistently each time, not changing the patient's body position for better leverage, etc. At that point, the art factor of manual muscle testing begins and the examiner applies pressure at a constant speed, giving the patient the ability to contract. Finally, the examiner evaluates the amount of pressure it takes to overcome the isometric contraction of the patient, taking the muscle into an eccentric contraction.

The examiner must continue to use his scientific knowledge even during the phase of artful muscle testing, observing the patient's attempts to re-direct the force to better recruit synergistic muscles. The examiner must also be aware of attempts of the patient to move against stabilization for better recruitment of synergistic muscles.

In some muscle tests, the examiner should observe for maximum isolation of the prime mover being tested. This is exemplified by observing for the tendon rising when testing the peroneus longus and brevis, as opposed to the tendons of the extensor hallucis longus and the peroneus tertius. Location for palpation of the muscle belly will be mentioned in some tests when this is of value in determining that the muscle is contracting adequately.

Body Language of Weakness. It is important that the examiner be aware of the body language of muscle weakness. This can be present in the testing position, while the test is actually being performed, or observed as the patient moves about, arises from the examination table or chair, etc. These movement variations in the presence of muscle weakness are listed as movement aberrations in this text. The examiner also observes postural imbalances because of the relative weakness of antagonist muscles.

Information gained from the examiner's observation of the body language of weakness gives indication that a specific muscle is weak, and generally guides the examiner to the muscles that should be tested. The individual knowledgeable in manual muscle testing will be able to correlate the body language of weakness, the information gained from anatomical knowledge, and the actual test force to verify the findings derived from the test procedure. Listed below are the four major factors of the body language of weakness:

1. Testing position: the patient is placed in the testing position, or is directed by the examiner into the testing position. If he is directed into the position, the examiner evaluates his ability to go there directly without additional motions caused by synergistic muscle activity.

Depending on the test, the patient will generally be able to assume the testing position with ease unless the prime mover to be tested is weak. There are specific movements the patient will make to recruit synergistic muscles in the presence of a weak prime mover; the examiner should be aware of them.

If the patient is placed in the testing position by the examiner, he should be able to hold the position unassisted. Here the patient will move from the testing position to one which better recruits synergistic muscles if the prime mover is weak. If he makes these movements, the examiner should put the patient back into the testing position, directing that it be held. In this way the examiner can re-evaluate the patient's ability to hold the testing position, taking into account the possibility that the patient may not have been aware of the necessity of holding the exact testing position.

2. During test: as the testing pressure is applied, the patient with a weak prime mover will tend to move his body to place the synergistic muscles at better advantage. The movement

may be flexing an extremity —such as the knee — forcing strongly against stabilization, or using a muscle which is not a part of the test. An example of this is contraction of the biceps brachii when the teres minor is being tested. The forearm is only used to impart rotation to the humerus. Flexion or extension of the elbow is not part of the test.

3. **Movement aberrations:** patient evaluation is a continuous procedure from the time he first comes in for consultation until the examiner last sees him on that particular visit. Clues of imbalance or weakness are observed when the patient moves in a manner which is not in the usual economy of effort. Rotational or lateral movements may not be equal on both sides. When applicable, these movement aberrations are listed with the muscle throughout the testing section of the text.

4. **Postural imbalance:** postural observation of the patient can be a formal one using a plumb line and grid system, with the patient standing in a static position. Considerable postural evaluation can be observed as the patient sits in consultation, stands in front of the examiner listening to an explanation or instructions, etc. Constant observation of body balance, as well as any movement aberrations, may detect problems which might otherwise be overlooked.

Alternate Testing Methods. The first test position listed in this text is the recommended testing position. There are many instances when a different position may be desired or required. Sometimes a change is used simply for convenience because that is the position the patient is in at the time. Whenever comparative muscle tests are made before and after treatment, the same position should be used.

There are occasions when a different test position is mandatory for correct evaluation of the patient. The patient may be unable to assume a specific test position because of pain or some other reason.

Muscle testing ability may be improved in a position other than the usual one. An example is when the hamstring muscles cannot be effectively tested because they cramp when the patient is in the prone position. The hamstrings can be more accurately tested on this patient seated because the muscles do not tend to cramp when elongated by hip flexion.

Additional factors introduced into the testing position will often cause a change in the muscle strength. An individual may have a latissimus dorsi strong in the seated or supine position which is weak in the standing position because of a foot subluxation or other dysfunction of the weight-bearing mechanism.

Nerve Supply. The nerve supply to the muscle is listed from a variety of sources.[1, 7, 9, 20, 21, 23, 28] Weakness of a specific muscle or groups of muscles could indicate trauma or pathology to the nerve supply, which should be considered. Most muscular weakness discovered with manual muscle testing is functional in nature; it could be a subluxation literally any place, including the spinal column and extremity articulations. Treatment could be required at a reflex point, such as the neurolymphatic, neurovascular, or other reflex. The meridian system or cranial-sacral primary respiratory system may be at fault. As progress continues in applied kinesiology, more factors causing muscular imbalance are found on a regular basis.

Neurolymphatic Reflex.[14, 37] A word description and a small illustration are given for the location of the neurolymphatic reflex, which is usually on the anterior and posterior. In some cases the location is not known.

Neurovascular Reflex.[4, 5, 15] The neurovascular reflex location is described, and a small illustration is provided for each muscle if the location is known.

Stress Receptor.[18] A small illustration of the stress receptor is provided if its location for the muscle is known.

Reactive Muscle Correlation.[19] Muscles sometimes weaken immediately following the contraction of another muscle. The other muscle involved is often a synergist, antagonist, or fixator of the muscle which weakens. It may be ipsilateral or contralateral. Listed with each muscle throughout this section are muscles that may be involved on a reactive basis. They are listed as muscles which are "reactive to," meaning that the muscle being discussed may weaken secondarily to contraction of the muscle listed under "Reactive Muscle Correlation." The reactive muscle correlation is typically an interchangeable relation between two muscles; in other words, the quadriceps can be reactive to the hamstrings, or the hamstrings can be reactive to the quadriceps. All possible reactive muscle correlations are not listed in this text. These are the most common combinations and should be evaluated first; if this is unsuccessful, the examiner must use his knowledge of the interactions of the body to search for possible reactivity.

Nutrition.[16] The probable nutritional correlations with a weak muscle are listed throughout the muscle testing section of this text. Nutritional products are listed in generic terms. If the reader is not familiar with products containing these substances, he should consult nutritional distributors for charts which convert generic terms to brand names. The list of nutritional supplements is not all-inclusive of what

may be required as a nutritional support for a weak muscle and its generalized energy pattern. Nutrition should be tested as indicated in that section of this text. It is recommended that it be used only when there is a positive response when testing the patient as described.

Meridian Association.[17] The meridian listed is the one most frequently associated with the muscle. In most instances, there is a highly specific meridian-muscle association. In a few instances there have been some discrepancies regarding which meridian is associated with a specific muscle in applied kinesiology. When this has occurred, it has been found that either of the disputed meridians can occasionally cause change in the muscle function. Listed in this text is the meridian most commonly found associated with the muscle and generally accepted by the majority of applied kinesiologists.

Organ/Gland Association.[14] The organ or gland associated with the muscle function is listed. In some instances no association is given simply because none has been determined. In other cases there is a listing which does not fit the general pattern, such as the teres major associated with the spine. This is because the only association that has been made is a specific characteristic. In the teres major instance, the association is that of bilateral teres major weakness with thoracic spine fixations. Where the organ or gland association is listed as provisional, there has been too little investigation to indicate probable association. There are usually other muscles established with the specific organ/gland association which are easier to test, or seem so well-associated that evaluation of additional muscles has not been pursued.

General Discussion. This final area of the muscle testing section will give information of general interest regarding a muscle or muscle group. Specific factors which are common causes of muscle weakness are discussed. Observations made during electromyographic studies, as well as other physiologic information, will be presented here.

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Chapter 16

Pelvis and Thigh Muscles

Hamstrings — Medial

SEMITENDINOSUS — MEDIAL HAMSTRING

Origin: Ischial tuberosity with tendon of biceps femoris.

Insertion: Proximal portion of medial surface of the tibia and deep fascia of the leg.

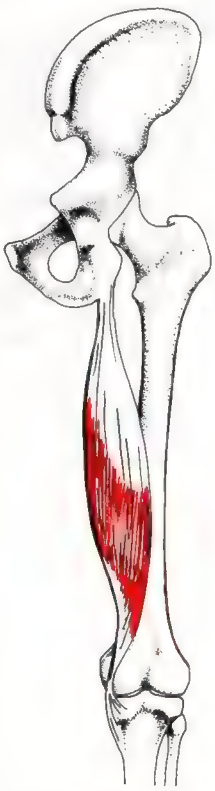
Action: Flexes and medially rotates the knee; extends, adducts, and medially rotates the thigh.

Reversed Origin-Insertion and Change of Action: When leg is fixed, assists posterior stability of the pelvis and extends the pelvis on the hips.

Markee et al.[22] describe the semitendinosus as having action of a digastric nature. It is described morphologically as two muscles attached to an intervening tendinous inscription. The inscription may be thought of as a strengthening of the tensor fascia lata, serving as a yielding insertion for the muscle fibers of the proximal and distal parts of the muscle. The nerve supply, which is the tibial branch of the sciatic nerve, develops two branches innervating the proximal and distal portions of the muscle. Thus the proximal portion has been said to contract to extend the hip, or the distal portion to flex the knee. (See further discussion under "Hamstrings — General Discussion," page 268).

Nerve Supply: Sciatic (tibial branch, which develops two branches[22]), L4, **5, S1, 2**

16—1. *Semitendinosus*



16—2. *Semimembranosus*

SEMIMEMBRANOSUS—MEDIAL HAMSTRING

Origin: Upper and lateral aspect of ischial tuberosity

Insertion: Posteromedial surface of the medial condyle of the tibia.

Action: Flexes and medially rotates the knee; extends, adducts, and medially rotates the thigh.

Reversed Origin-Insertion and Change of Action: When the leg is fixed, gives posterior stability to the pelvis and extends the pelvis on the hip.

Testing Position for Medial Hamstrings: Prone patient flexes knee to approximately 60°; medially rotates the thigh and also the tibia on the femur.

Patient Fixation Requirements: The pelvis must be stabilized by the trunk extensor muscles so that pelvic motion cannot take place. The pelvis must not be allowed to raise from the table.

Stabilization: The examiner usually stabilizes across the posterior thigh in the bellies of the hamstring muscles. Occasionally he must decide to stabilize the pelvis on the table to avoid pelvic tilt and to keep the patient from lifting his pelvis from the table.

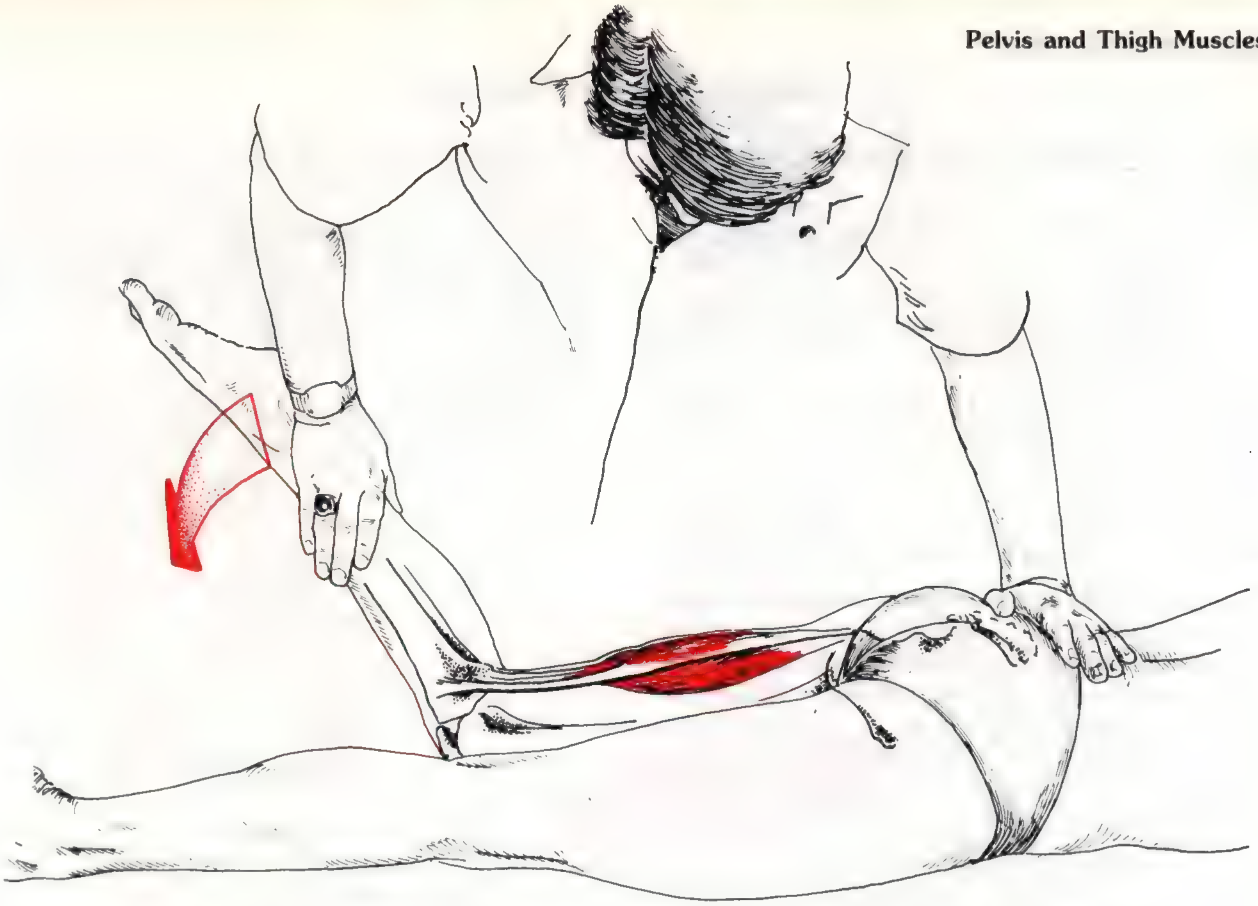
Synergists: Biceps femoris, gastrocnemius, gracilis, sartorius.

Nerve Supply: Sciatic (tibial branch), L4, **5, S1, 2**

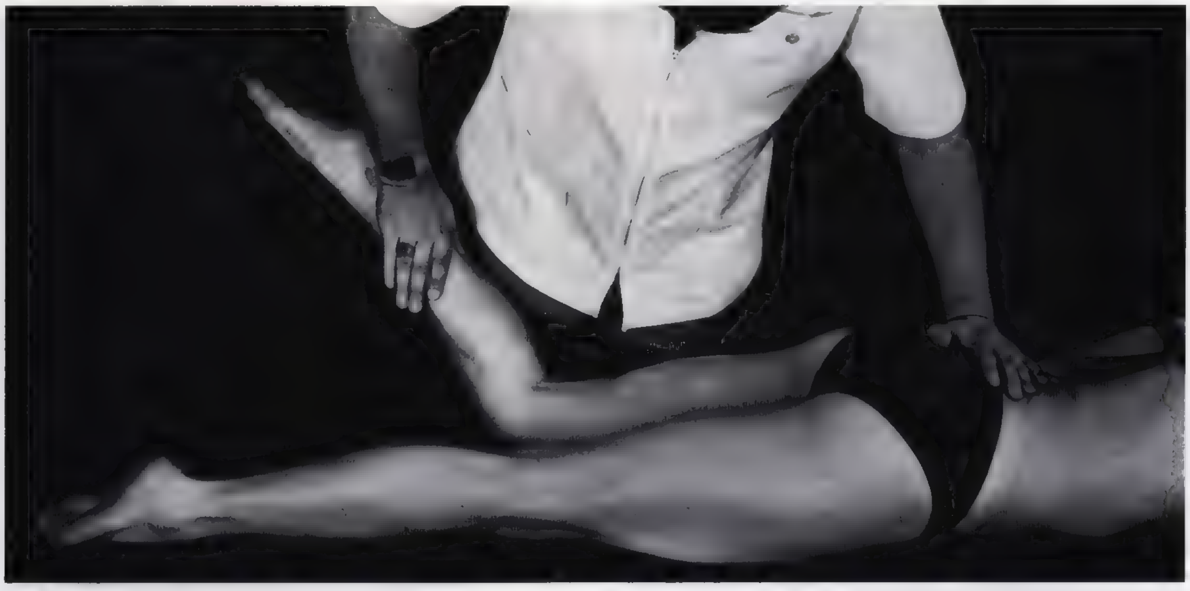
Test for Medial Hamstrings (also see hamstrings tested as a group): Pressure is directed against the distal leg in a direction of knee extension, slightly lateral. The examiner should note the direction of pressure which best raises the medial hamstring tendons and minimizes the raising of the lateral hamstring tendon.

Body Language of Weakness (also see hamstrings tested as a group):

- **During test:** Elevation of the pelvis to more effectively recruit synergistic action of the gracilis and sartorius. Evaluate for contraction of the semimembranosus and semitendinosus and diminished contraction of the biceps femoris by palpating the muscle bellies.
- **Postural imbalances:** Slight lateral rotation of the tibia on the femur. The medial hamstrings, together with the sartorius and gracilis, give medial knee stability. Because of their insertion below the articulation, the distal aspect of the tibia will deviate away from the midline, giving a genu valgus or knock-knee condition. If the genu valgus is primarily due to medial hamstring weakness, there will be an external tibia and foot rotation.



16—3. Medial hamstrings — semimembranosus and semitendinosus. Force is applied in the direction of the arrow. Generally, stabilization is over the bellies of the hamstring muscles. For clarity of illustration, the examiner's stabilizing hand is on the pelvis.



16—4.

Alternate Testing Method: The position for the seated test is medial rotation of the thigh and the leg on the femur. The examiner, while stabilizing the knee, pulls on the distal leg in a direction of leg extension.

Hamstrings — Lateral

BICEPS FEMORIS — LATERAL HAMSTRING

Origin:

Long head: Ischial tuberosity and sacrotuberous ligament.

Short head: Lateral lip of linea aspera, lateral supracondyle of femur and lateral intermuscular septum.

Insertion: Lateral side of the head of the fibula, lateral condyle of the tibia, deep fascia on the lateral side of the leg.

Action: Flexes knee, extends thigh, laterally rotates the knee joint, laterally rotates and adducts thigh.

Reversed Origin-Insertion and Change of Action: The long head gives posterior stability to the pelvis and extends the pelvis on the hip. The biceps femoris is a double muscle receiving two nerve supplies. It can independently extend the hips or flex the knee[22] in combination with other muscles.[1] (See further discussion under "Hamstrings — General Discussion," page 268).

Testing Position: Prone patient flexes knee to approximately 60°. Thigh is laterally rotated, and the tibia is laterally rotated on the femur.

Patient Fixation Requirements: The pelvis must be kept flat on the table; there must be strong fixation of the pelvis by the trunk extensor muscles.

Stabilization (also see hamstrings tested as a group): The examiner generally stabilizes the thigh against the table by pressure on the posterior thigh. He may need to stabilize the pelvis if the patient tends to tilt the pelvis or elevate it from the table.

Synergists: Semimembranosus, semitendinosus, gracilis, sartorius, gastrocnemius.

Test: During the test, the examiner should observe for the direction of pressure that best puts tension on the tendon of the biceps femoris and less tension on the tendons of the semimembranosus and semitendinosus. Observe for muscular contraction of the biceps femoris and diminished contraction of the semimembranosus and semitendinosus muscles by palpation.

Body Language of Weakness:

Postural imbalances: Medial rotation of the tibia on the femur. The biceps femoris gives lateral knee stabilization. Because the tendon inserts below the knee, weakness allows the distal tibia to deviate toward the midline, thus giving a genu varus or bowleg position. If genu varus is present primarily because of biceps femoris weakness, there will be medial tibia rotation along with medial foot rotation.

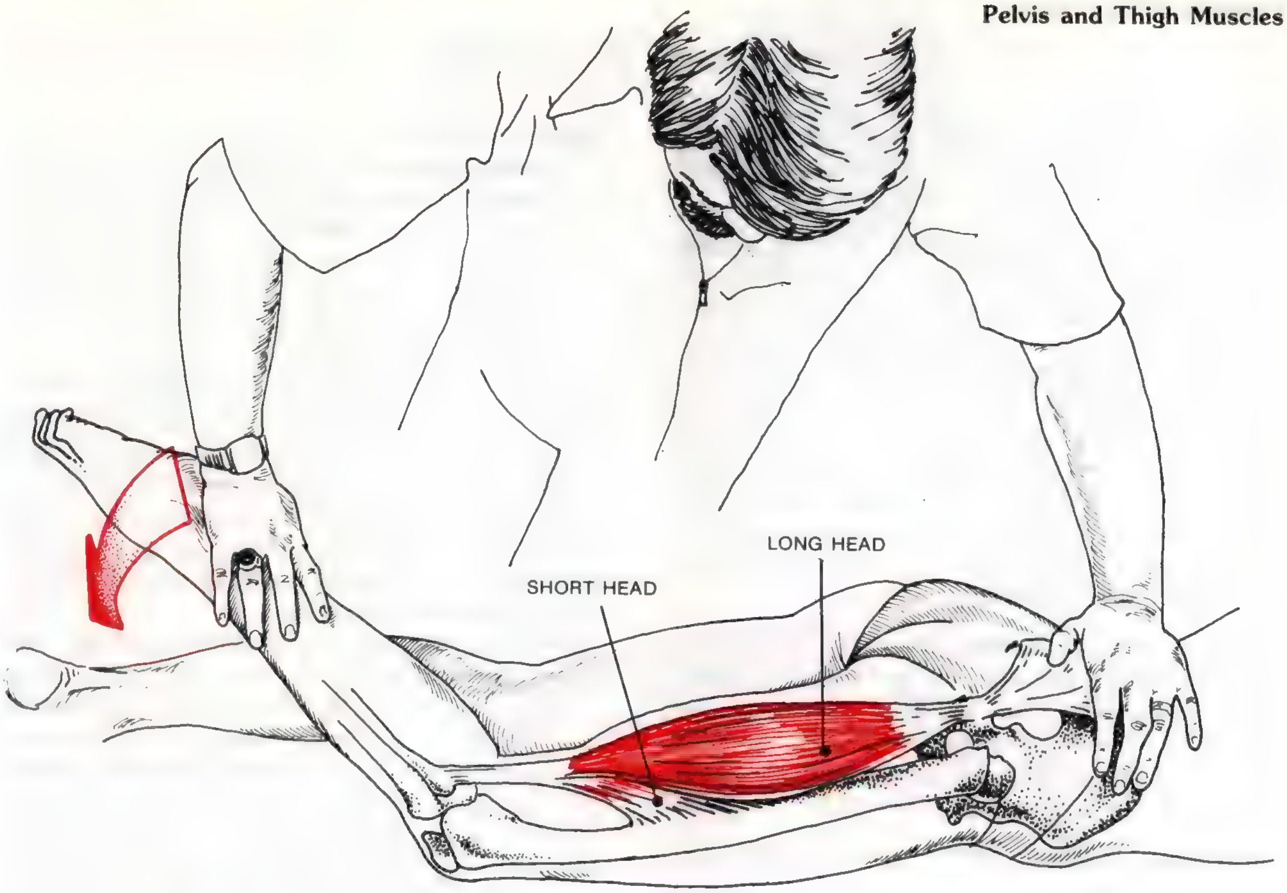
Alternate Testing Method: The seated patient laterally rotates his thigh and tibia on the femur. The examiner directs a pull on the distal leg in the direction of knee extension.

Nerve Supply:

Long head: sciatic, tibial branch, L5, **S1, 2,** 3

Short head: sciatic, peroneal branch, **L5, S1, 2**

16—5. Lateral hamstring — biceps femoris



16—6. Biceps femoris - lateral hamstring. Direction of testing pressure is indicated by the arrow. Generally the stabilization is over the belly of the muscle. For clarity of illustration, the stabilizing hand is placed on the pelvis. Note the subject plantar-flexing the ankle (see text, page 266).

16—7.

Hamstrings (continued)

Testing Position of Hamstrings as a Group: Prone patient flexes knee to approximately 60° with no rotation of the thigh.

Patient Fixation Requirements: The pelvis should remain flat on the table. With isokinetic dynamometer testing and electromyography, Markham[23] demonstrated that without stabilization of the patient's thigh or pelvis against the table, there was greater force of contraction and electrical activity of the hamstrings. There was also a change in electrical activity and force of contraction when the patient was allowed to dorsiflex or plantar-flex the ankle.

In addition to stabilizing the pelvis on the table, the patient's lower trunk extensor muscles must be able to fix the pelvis to the trunk.

Stabilization: The examiner generally stabilizes the thigh on the table with pressure over the bellies of the hamstring muscles. It may be necessary for him or an assistant to stabilize the pelvis to avoid rotation or tilting. This is especially necessary when there is poor fixation by the lower trunk extensors.

Synergists: Sartorius, gracilis, gastrocnemius, and tensor fascia lata

Test: The examiner directs pressure against the distal leg in a direction of knee extension. During the test, he must observe for several factors (discussed below).

Pressure should not be directed against the calcaneus, because it is possible to challenge a calcaneal subluxation while simultaneously performing the hamstring muscle test. Also, pressure against the calcaneus lessens the examiner's ability to evaluate ankle position changes for efforts to increase synergism of the gastrocnemius.

Management of cramping: If there is a tendency for muscle cramping, it will probably be evident when testing the hamstring muscles. Because the hamstrings traverse the hip and knee joints, the prone position allows great shortening of the hamstrings. This makes cramping very problematic, especially if the examiner allows the knee to flex past the 90° position. When testing the hamstrings in the prone position, stabilizing pressure in the bellies of the muscles will help prevent cramping. If the patient has a significant calcium deficiency or other systemic involvement, it may be almost impossible to accomplish hamstring testing in a prone position. Putting the patient in a seated position for the test lengthens the hamstrings by hip flexion, thus enabling the individual to exhibit more power in these muscles with less chance of cramping.

Body Language of Weakness:

Testing position: The patient with weak hamstrings will typically try to bring the leg into flexion greater than 60°. The greater flexion, especially if past 90°, shortens the hamstring muscles — "locking" the muscles — and thus makes any evaluation of the integrity of the muscle group difficult.

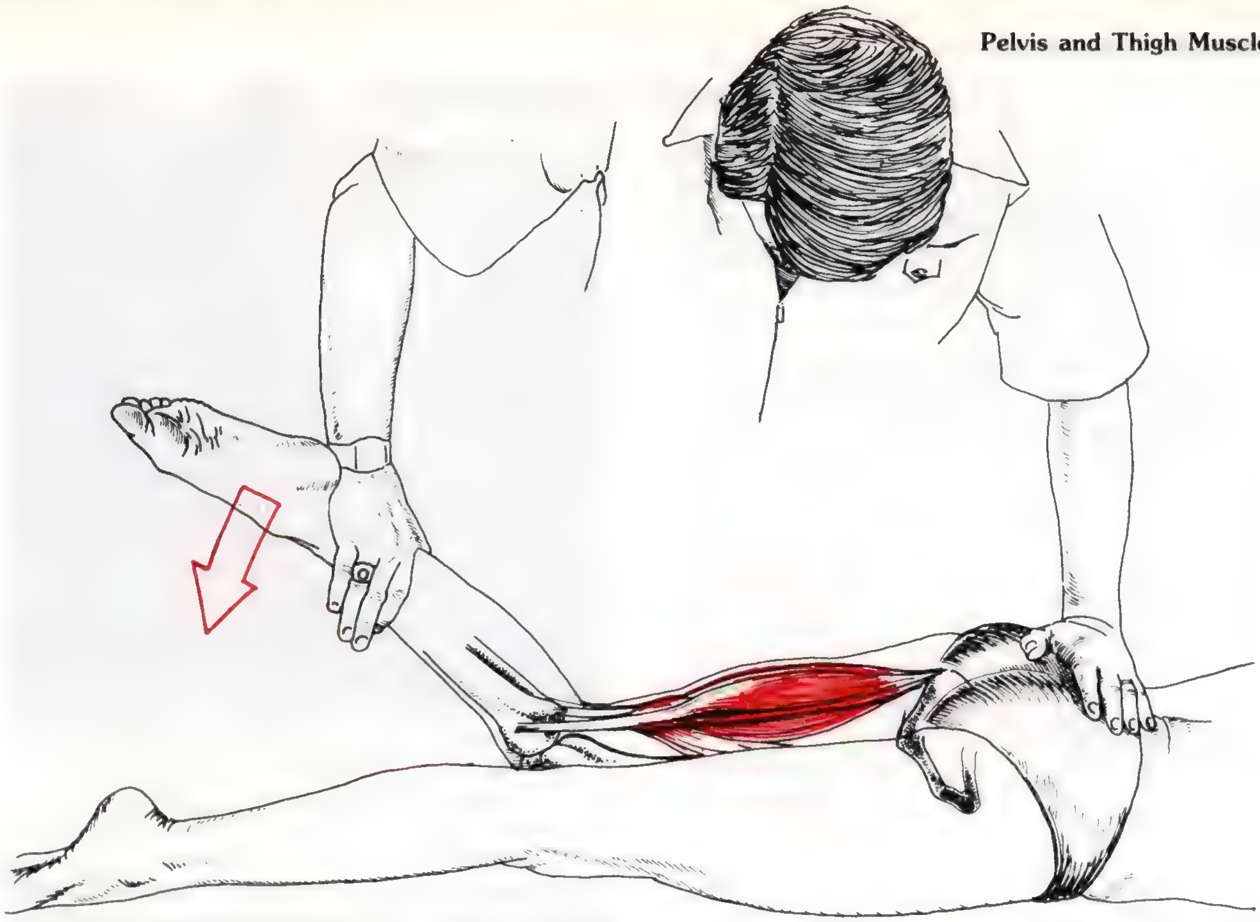
In an effort to recruit more synergistic action from the gastrocnemius, the patient may attempt to completely dorsiflex or plantar-flex the foot, locking it in that position and giving the gastrocnemius a more stable base from which to pull. Because of the short range of gastrocnemius contraction, it does not have a great influence in the hamstring test.

During test: Because of the hamstrings' great power and dominancy over other knee flexors — such as the sartorius, gracilis, and gastrocnemius — they are relatively easy to maintain as the prime mover. A major problem is keeping the patient from changing position in comparative tests. There will be a tendency for the patient to raise the pelvis from the table. If this happens, the examiner must determine whether to put pressure in the bellies of the hamstring muscles to help prevent cramping, or to stabilize the pelvis. In either case, comparative tests should be done identically.

Postural imbalances: The hamstrings give posterior stability to the pelvis. Weakness allows anterior tilting of the pelvis with increased lumbar lordosis, possible facet jam, and/or an imbrication type of subluxation. The hamstrings are very strong posterior pelvic stabilizers in the standing position, much more so than the gluteus maximus, which is electrically active only against resistance. The hamstrings and gluteus maximus are electrically inactive during quiet standing.[1] Because of the importance of the hamstrings in giving posterior stability to the pelvis, there is a great possibility for a sacroiliac subluxation in the presence of weakness, with the ischial tuberosity going posterior.

Alternate Testing Methods: The seated patient fixes the pelvis to avoid tilting during the testing procedure. The examiner pulls on the distal leg in a direction of knee extension while stabilizing the knee.

The hamstrings can be tested in the supine position, which is especially useful when evaluating for reactive muscles, by having the patient flex the hip and knee. The examiner stabilizes the knee and pulls on the lower leg in a direction of knee extension.



16—8. General hamstring test. Pressure is applied in the direction of the arrow to extend the knee from the flexed position. Generally stabilization is over the bellies of the muscles. For clarity of the illustration, stabilization is being applied to the pelvis.

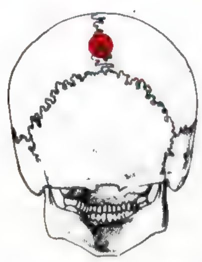
16—9.

Hamstrings (continued)

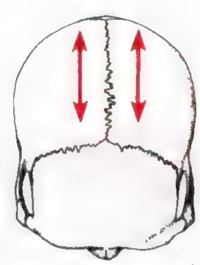
Testing the hamstrings in a weight-bearing position is best accomplished with the patient leaning against a hi-lo table. If this is not available, the patient can be stabilized against a wall. The test is accomplished in a manner similar to that of the prone test.

Neurolymphatic:
Anterior: over the lesser trochanter of the femur.
Posterior: upper sacroiliac articulation by the posterior superior iliac spine.

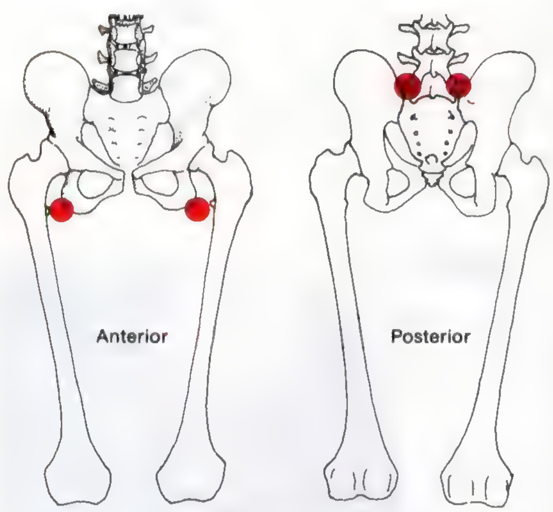
Neurovascular: 1" above the lambda



NEUROVASCULAR



STRESS RECEPTOR



NEUROLYMPHATIC

Reactive Muscle Correlation: Sacrospinalis, opposite latissimus dorsi, quadriceps, popliteus.

Nutritional: Vitamin E; consider the possible need of betaine hydrochloride if muscle cramping is present, or other calcium requirements.

Meridian Association: Large intestine

Organ Association: Rectum

General Discussion: Because the hamstrings are major pelvic posterior stabilizers, they are often involved in pelvic imbalance or with a sacroiliac subluxation. When there is a subluxation of the sacroiliac, it will generally be a posterior ischium of the category II variety. The hamstrings are also important to consider with a category I pelvic involvement.

The hamstrings are generally tested as a group in general applied kinesiology application. The individual testing of the medial and lateral hamstrings is important when knee involvements are present, or if there are apparent rectal problems and the muscle-organ relationship does not appear to correlate.

The hamstrings may exhibit shortness secondary to trauma and hypokinesis (usually complicated by an occupation which requires continuous sitting). For example, a truck driver sits for hours in a position of knee flexion, rarely stretching the hamstrings to their full extent. Short hamstrings are observed posturally by posterior pelvic rotation and a flattened lumbar spine. They are easily recognized in a clinical examination by the straight-leg raise. The examiner should determine the point at which the pelvis begins to rotate posterior from tension of the hamstrings during the straight-leg raise. Short hamstrings respond well to the spray and stretch and fascial release techniques used in applied kinesiology. (Exercise procedures to stretch short muscles are discussed in Volume IV.)

Action of either the proximal or the distal head of the semitendinosus and biceps femoris was mentioned earlier under the heading, "Reversed Origin-Insertion and Change of Action." The hypothesis was presented by Markee et al.[22] as a result of morphological studies of the muscles in human cadavers, and by electrical stimulation in anesthetized dogs by spinal transsection or cortical stimulation. The exposed muscle was evaluated by palpation, inspection, and electrical potential. The semitendinosus, semimembranosus, biceps femoris, quadriceps femoris, sartorius, and gracilis were all studied in this manner. Markee and his associates concluded that all these muscles can, by contraction, produce tension at one joint only.

In a discussion following the presentation of this paper, Phelps[27] reported using Novocain® injections in the belly of the muscle to relax spasticity for differential diagnosis. He observed in the semitendinosus that if spasticity affected hip motion, injection into the proximal aspect of the muscle relaxed it; injection into the distal portion had no effect.

Basmajian[1] disagrees with the conclusions of Markee and his group. Fujiwara and Basmajian[9] demonstrated electromyographically with three to five needle electrodes placed in a row along the muscle that regardless of movement of one joint or the other, the electrical potential of the muscle was the

16—10. *Usual stabilization over the bellies of the muscles. This helps stabilize the pelvis against the table as well as control cramping.*

same. This indicates that the proximal or distal aspect of the muscle does not contract independently. In a laboratory preparation, proximal and distal parts of two-joint muscles can be made to contract independently by individually stimulating the appropriate nerve branch. Basmajian goes on to point out that when a two-joint muscle participates in motion of only one joint, it does so in close coordination with other muscles.

The question of two-joint muscles acting in a divided manner to affect one joint or the other may have important consequences in applied kinesiology evaluation of function. The location of apparent proprioceptive dysfunction in two-joint muscles seems to correlate with the function of that section of the muscle. Markee et al. stated, "Reciprocal innervation plays an important role in the control of the thigh muscles of the dog. The separately functioning portions of these muscles are reciprocally innervated, but not necessarily with another portion of the same muscle. Instead, reciprocal innervation is of the type which involves activity of the muscles acting on the opposite side of the joint concerned. Thus the proximal portion of the semitendinosus is reciprocally innervated in relation to the flexors of the thigh; the distal portion of the semitendinosus is reciprocally innervated in relation to the extensors of the knee." When hamstrings are reactive to quadriceps or vice versa, the treatment directed to a neuromuscular spindle cell will typically be either proximal or distal in the two muscles, which appears to correlate with the concept of separate action of the muscles. The possibility of independent action of the proximal and distal aspects of a two-joint muscle seems to give better understanding of muscle reactivity as observed in applied kinesiology. Basmajian's study and conclusions are from normal subjects. It seems possible that a deliberate testing motion of normal subjects may miss the isolated function of the proximal or distal portion of the muscle, whereas normal action — as in walking — requires the activity. There is a phasic action of the hamstrings during walking which is not observable during some testing procedures. The semitendinosus has a tri-phasic pattern, while the semimembranosus is bi-phasic in its action during each walking cycle.[1]

It is clear from the excellent work of Basmajian and his co-workers that two-joint muscles do not function as the independent sections described by Markee et al. Clinical observation in applied kinesiology indicates that Markee's observations should be kept in mind in the further evaluation of proprioceptive dysfunction of the two-joint muscles as accomplished in AK.

16—11. *Knee excessively flexed allows muscles to cramp and makes test difficult to judge.*

Quadriceps

RECTUS FEMORIS

Origin:
Straight head: from anterior inferior iliac spine
Reflected head: from groove on upper brim of acetabulum

Insertion: Upper border of patella by the ligamentum patella into tibial tubercle.

Action: Extends the leg and flexes the thigh.

Reversed Origin-Insertion and Change of Action: Flexes the pelvis on the thigh and gives anterior stabilization to the pelvis.

Markee et al.[22] described separate action of the proximal and distal sections of the rectus femoris, the proximal being capable of flexing the hip independent of activity from the distal section on the knee, and vice versa. This was attributed to a strong intimate relationship of the medial portion of the muscle to the fascia lata, the adjacent sartorius, and to the adductor longus. The nerve supply branches to independently supply the upper and lower portions. Independent function of the muscle as described by Markee and his co-workers has been shown not to be present as noted.[9] It does seem probable that the branching nerve supply as described is important in evaluating this type of muscle in AK with regard to the muscle proprioceptors (see discussion of two-joint muscles on page 268).

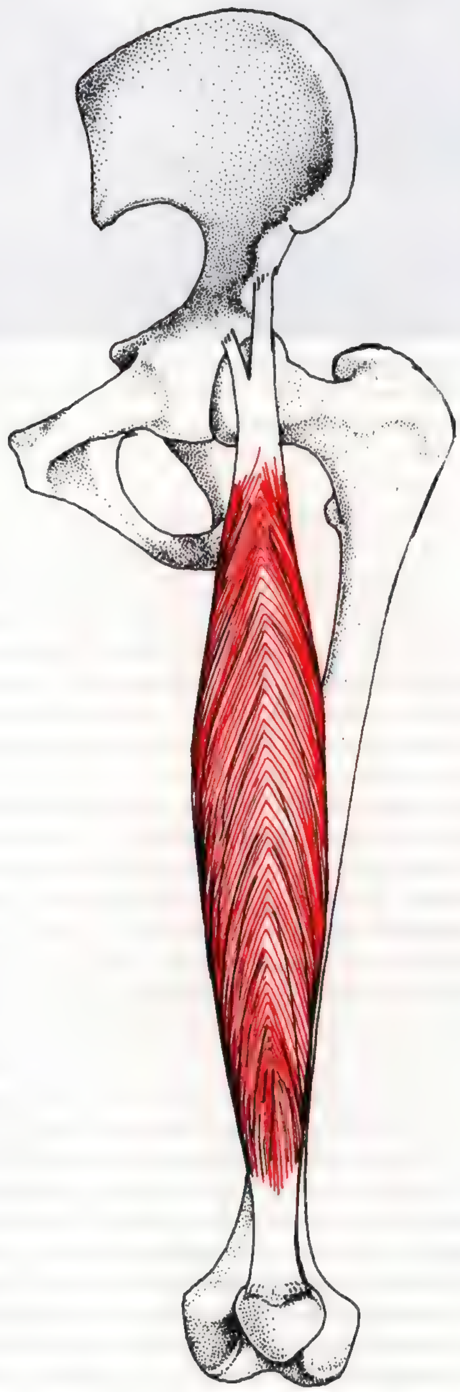
Testing Position: The supine patient flexes the hip and knee to 90°, with no thigh rotation.

Patient Fixation Requirements: The abdominal muscles must fix the pelvis to the trunk.

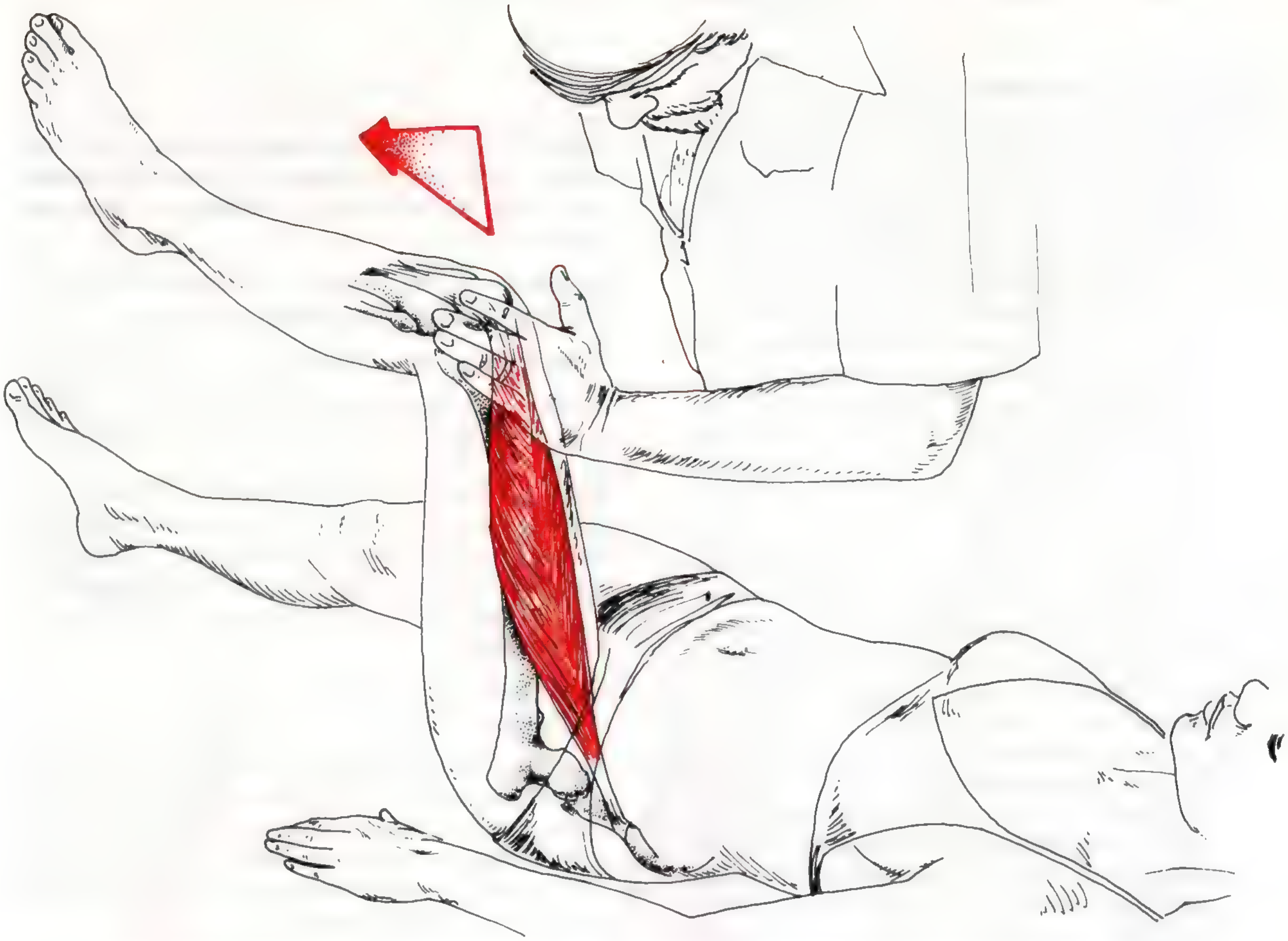
Stabilization: The patient's body weight generally provides adequate stabilization, with the exception of possibly slipping on the table. The patient should hold the edge of the table if there is a tendency to slip. The major factor in the examiner's control of the test is not to allow the thigh to internally or externally rotate during the procedure.

Synergists: Psoas, sartorius, tensor fascia lata

Test: The examiner directs force against the anterior thigh just proximal to the knee in a direction toward hip extension, ascertaining that no thigh rotation is present and that the knee stays flexed approximately 90°. A slightly-built examiner may need to hold the side of the table to provide added power in this test. The psoas is very active in this test and must be evaluated separately to make a comparison with the rectus femoris. Observation of the patient going into the test position reveals considerable information regarding his hip flexor strength.



16—12. Rectus femoris.



16—13. Rectus femoris. Care must be taken that no internal or external thigh rotation is allowed. Testing pressure is in the direction of the arrow.

16—14.

Quadriceps (continued)

Body Language of Weakness:

Testing position: The examiner can determine the relative activity of the rectus femoris with its synergists by observing the patient going into the testing position. When the sartorius is the primary mover, the thigh will rotate laterally. If the psoas is the primary mover, the thigh will probably rotate laterally. The function of the psoas as a medial or lateral hip rotator has been the subject of considerable controversy (see page 304). The tensor fascia lata rotates the thigh medially during hip flexion. When the rectus femoris is the primary mover, the patient will bring the hip into straight flexion without thigh rotation. To help evaluate the muscles acting as the prime mover — or possibly muscles failing to act — it is necessary for the examiner to compare muscle action. For example, the thigh may laterally rotate, not from the sartorius being recruited to aid the rectus femoris, but from the tensor fascia lata failing to act as an antagonist to the sartorius' lateral rotation action.

During test: The patient will attempt to rotate the thigh medially or laterally to recruit more synergistic muscle action. Increasing knee flexion during the test indicates recruitment of the sartorius and possibly the tensor fascia lata, or an attempt to change the length of the rectus femoris by the knee flexion.

Movement aberrations: See quadriceps as a group.

Postural imbalance: Decreased anterior stabilization of the pelvis. To evaluate weakness of this muscle on a postural basis, it must be correlated with the strength of other hip flexors. Weakness is common with a posterior ilium subluxation and probably contributes to it.

Alternate Testing Methods: The patient can be tested in a seated or standing position. In the seated test, the patient flexes the hip, lifting the distal thigh from the table. The examiner directs pressure on the anterior distal thigh in a direction toward hip extension. The standing test is best accomplished with the patient leaning with his back against an upright hi-lo table. The hip and knee are flexed to 90°, and the examiner directs pressure in a manner similar to the supine rectus femoris test. The seated and standing tests are both weight-bearing, putting different aspects into the tests. The seated test considers the pelvis and spinal column as weight-bearing, while the standing test adds the weight-bearing factors of the contralateral leg.

VASTUS MEDIALIS

Origin: Lower half of the intertrochanteric line, linea aspera, medial supracondylar line, medial intermuscular septum, tendons of adductor magnus and adductor longus.

Insertion: Medial border of the patella by the ligamentum patellae into the tibial tubercle.

Action: Extends the leg and draws the patella medial.

Testing Position: The seated patient extends the knee to a point just short of locking it in extension.

Stabilization: Generally the patient's weight provides adequate stabilization. The examiner may need to stabilize the thigh against the table if the patient has a tendency to raise with the test or is light-weight. The patient can also hold the edge of the table for stabilization.

Synergists: Rectus femoris, vastus lateralis, vastus intermedius.

Test (see also quadriceps as a group): The examiner directs force against the anterior lower leg in a slightly lateral direction toward knee flexion. The best direction of force is determined by the examiner's palpation and observation of the synergistic quadriceps for their activity.

Body Language of Weakness (see also quadriceps as a group):

Postural imbalance: Lateral deviation of the patella.

VASTUS INTERMEDIUS

Origin: Proximal 2/3 of the anterolateral surface of the femur, lower half of the linea aspera, upper part of the lateral supracondylar line, lateral intermuscular septum.

Insertion: By tendons of the rectus and vastus muscles into the superior border of the patella and by the ligamentum patellae into the tibial tubercle.

Action: Extends the leg.

VASTUS LATERALIS

Origin: Intertrochanteric line, greater trochanter, gluteal tuberosity, linea aspera, lateral intermuscular septum, capsule of the hip joint.

Insertion: Lateral border of the patella by the ligamentum patellae into the tibial tubercle.

Action: Extends the leg and draws the patella lateral.

Testing Position: The seated patient extends the knee to a point just short of locking it in extension.

Stabilization: Generally the patient's weight provides adequate stabilization. The examiner may need to stabilize the thigh against the table if the patient has a tendency to raise with the test or is light-weight. The patient can also hold the edge of the table for stabilization.

Synergists: Rectus femoris, vastus medialis, vastus intermedius.

Test (see also quadriceps as a group): The examiner directs pressure against the anterior lower leg just proximal to the ankle in a slightly medial direction toward knee flexion. The direction of pressure is best obtained by observing and palpating the synergistic quadriceps for activity.

Body Language of Weakness (see also quadriceps as a group):

Postural imbalance: Medial position of patella.

16—15. Vastus medialis

16—16. Vastus intermedius

16—17. Vastus lateralis

16—18. Vastus medialis test.

16—19. Group quadriceps test.

16—20. Vastus lateralis test.

Quadriceps (continued)

Testing Position as a Group: The seated patient extends the knee to a point just short of locking it in extension. In the seated quadriceps test, the examiner must make certain that there is adequate padding at the edge of the table to avoid discomfort to the patient.

Patient Fixation Requirements: The pelvis must be fixed to prevent position change during the testing procedure.

Stabilization: Generally the patient's body weight is adequate stabilization. If the patient is light, or if he tends to lift his pelvis from the table, the examiner must stabilize the thigh against the table. Sometimes it is of value to have the patient hold the edges of the table to avoid lifting the pelvis.

Test: The examiner directs pressure against the distal anterior leg just above the ankle in the direction of knee flexion. Care must be taken not to allow the patient to lock the knee in extension. If the table edge is sharp, the examiner should place his hand under the knee to cushion it. The examiner should observe for change of pelvic position during the testing procedure.

Body Language of Weakness:

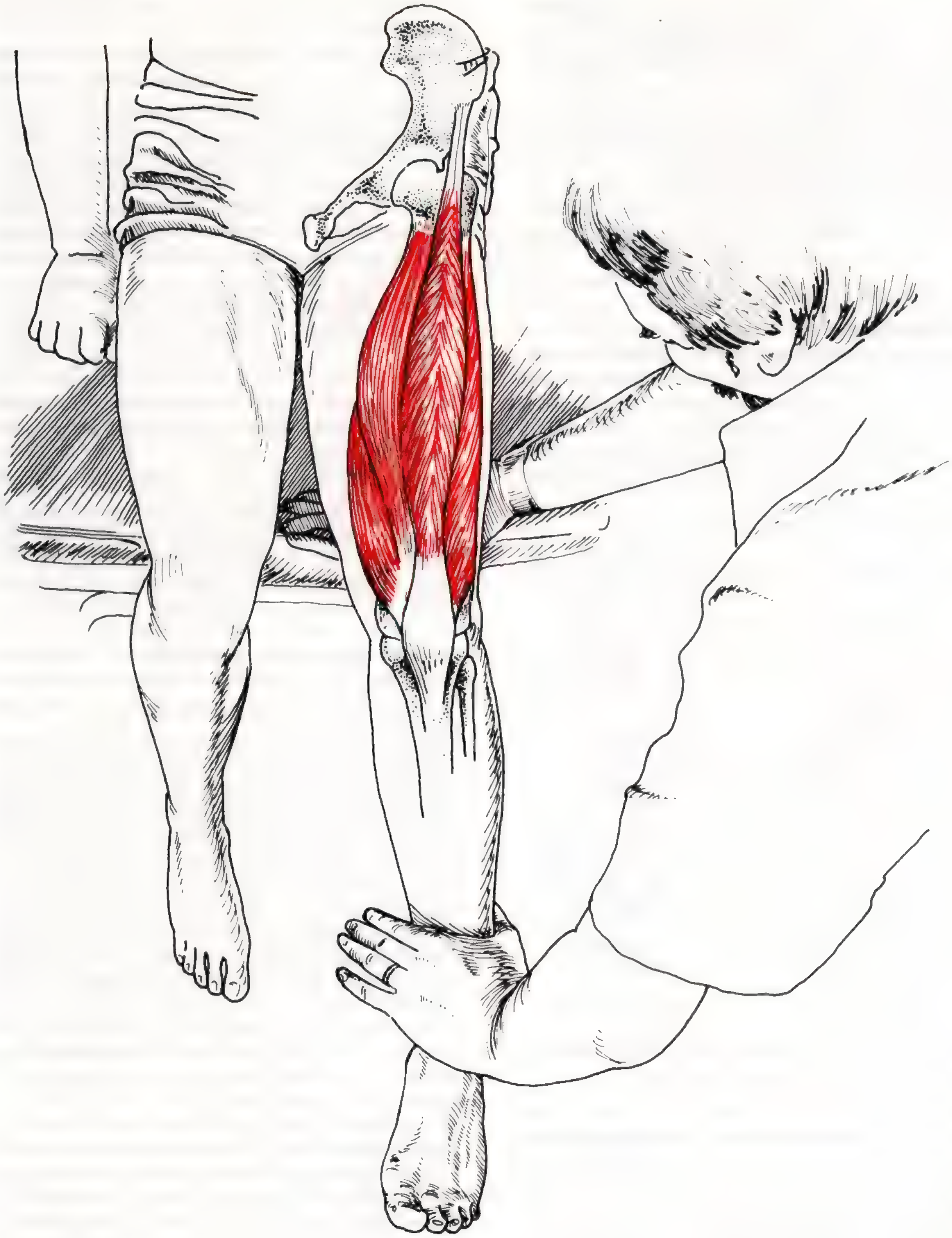
Testing position: The patient with weak quadriceps will attempt to place the knee into hyperextension to obtain a locking effect before the testing procedure begins.

During test: In an effort to avoid knee flexion, the patient will frequently lift his pelvis from the table or tilt it back for increased rectus femoris activity.

Movement aberrations: When arising from a chair, there may be a subconscious use of the hands on the anterior thighs or on the chair to aid the activity. The gait of a patient with weak quadriceps is one of obtaining hyperextension of the knee prior to placing weight on the extremity.

Postural imbalances: Knee hyperextension and, if the rectus femoris is weak, loss of anterior pelvic stabilization. Observe patella position for vastus lateralis and medialis weakness.

Alternate Testing Methods: Supine test for quadriceps as a group is done by flexing the hip and knee of the opposite leg, with the foot resting on the table. The hip and knee of the tested side are flexed; the examiner then places his arm under the knee, with his hand resting on the opposite knee as a base against which to test. Pressure is then directed toward the anterior lower leg similar to the seated



16—21. Quadriceps being tested as a group.

Quadriceps (continued)

quadriceps test. The patient should not be permitted to rotate the pelvis away from the table on the side being tested. The patient's body weight is generally adequate stabilization.

Testing the quadriceps group in the prone position is accomplished by the examiner stabilizing against the lower posterior thigh and pulling on the anterior lower leg in a direction of knee flexion. Care should be taken that the patient does not hyperextend the knee prior to the test. This position is used primarily when reactive muscle testing is being done.

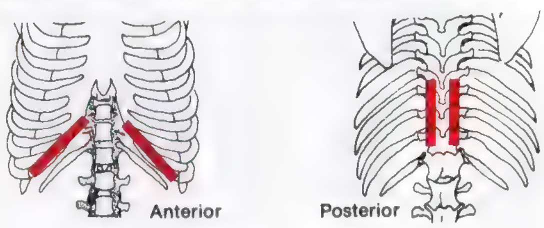
Nerve Supply: Femoral, **L2, 3, 4**

Neurolymphatic:

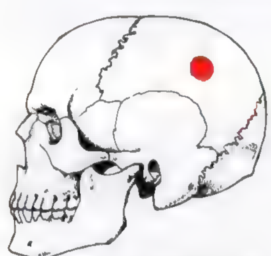
Anterior: along costochondral junction of the 8th-11th ribs. Activity of this linear neurolymphatic is inverse to involvement of the quadriceps muscle divisions. In other words, for the vastus lateralis, neurolymphatic activity will be medial; for the vastus medialis, the activity will be lateral on the reflex area.

Posterior: T8-11 laminae.

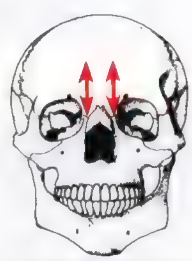
Neurovascular: Parietal eminence, posterior aspect



NEUROLYMPHATIC



NEUROVASCULAR



STRESS RECEPTOR

Reactive Muscle Correlation: Gastrocnemius, hamstrings, rectus abdominis, sartorius.

Nutritional: Vitamin D, vitamin B complex, small intestine nucleoprotein extract or concentrate.

Meridian Association: Small intestine.

Organ Association: Small intestine

General Discussion: When there is small intestine involvement, it is often involved with significant lymphatic congestion. Prolonged neurolymphatic reflex stimulation may be necessary.

The quadriceps muscles are generally tested as a group, or the rectus femoris is tested individually. It is important to test the vastus medialis and vastus lateralis when there is a knee involvement. Individual testing is sometimes necessary to find the muscle-organ relationship. There may be obvious evidence of small intestine involvement, even though the quadriceps as a group tests normal. Individual testing of the muscles may show weakness of one section correlating with the organ involvement. The elongated neurolymphatic reflex — and portions of it being related to different muscles of the quadriceps — seems to indicate that different muscles are associated with different sections of the small intestine.

Imbalance of these muscles will often cause a patella subluxation which interferes with normal knee activity. The fibers of the distal portion of the vastus medialis are markedly oblique, giving a medial pull to the patella.

The rectus femoris gives anterior pelvic support and should be considered whenever there is pelvic misalignment. LaBan et al.[19] demonstrated electromyographically that the rectus femoris is active throughout a sit-up. The early stages of the sit-up require pelvic stabilization for abdominal muscle activity.

In athletic injuries, there is frequently a reactive muscle involvement of the quadriceps. Here again, evaluation of the individual muscles is valuable in helping find the exact location of the proprioceptor involved.

Athletic trauma creates considerable quadriceps involvements observed in applied kinesiology. A relatively common finding is an athlete who has attempted to strengthen weak quadriceps by doing knee extension exercises with a weighted boot, yet the muscles still test weak. It is surprising to observe how weak the quadriceps can be on an individual having massive muscles who has been exercising regularly. The weakness usually changes to dramatic strength after a few minutes of applied kinesiology evaluation and application of the therapeutic approaches indicated. In this type of case, the quadriceps group or a muscle of the group often tests dramatically weak; following treatment, the examiner can apply his full weight in the muscle test.

The muscles of the quadriceps group have varied timing in their onset of action during extension of the knee from 90°-180°, and flexion back to 90°. Studies were done with the subject seated, no added load, added load, and standing.[1] The activity of these muscles during walking has slightly different timing from the swing-to-stance and back-to-stance phases. The rectus femoris is much less active than the vastus medialis, intermedius, and lateralis.[4]

Sartorius

Origin: Anterior superior iliac spine, upper half of the iliac notch.

Insertion: Upper part of medial surface of the tibia, near the anterior border.

Action: Flexes knee and hip, rotates the thigh laterally. When knee is flexed, rotates tibia medially. Gives medial support to the knee.

Reversed Origin-Insertion and Change of Action: When the leg is fixed, flexes the pelvis on the hip and gives anterior stabilization to the pelvis.

Testing Position: The supine patient flexes hip and knee with abduction and lateral rotation of the thigh. Care must be taken to prevent the patient from flexing the knee and hip excessively.

Patient Fixation Requirements: Normal abdominal muscles are necessary to prevent anterior pelvic rotation, giving the sartorius a strong base from which to function.

Stabilization: Generally the patient's body weight provides adequate stabilization. It may be necessary for the patient to hold the sides of the table to avoid slipping, especially if the table is covered with paper or the patient is light-weight.

Synergists: Biceps femoris, semitendinosus, semimembranosus, gracilis.

Test: The examiner directs force against the anterolateral thigh just proximal to the knee in a direction of hip extension, adduction, and medial rotation. With the other hand, traction is directed to the posterior ankle to extend the knee. This test requires synergism of testing pressure by the examiner. At the same time that traction is placed on the ankle for knee extension, the examiner's hand at the knee places a rotational factor into the test, as well as knee and hip extension. The examiner can improve his testing pressure by noting maximum isolation of the sartorius muscle by observation and palpation.

Body Language of Weakness:

Testing position: When weakness is present, it is common for the patient to attempt excessive knee and hip flexion. This allows the hamstrings to be recruited more actively as synergistic muscles. The patient will also attempt to limit the amount of hip abduction, again aligning the hamstrings for better synergistic action.

During test: Although the adductors are not directly synergistic in this muscle test, this activity brings the extremity into a better position to recruit the hamstring muscles as more active synergists. To avoid this, some examiners prefer to place the hand on the medial rather than lateral side of the knee. This is described under "Alternate Testing Methods."

Postural imbalance: Weakness allows the ilium of the pelvis to rotate posteriorly. The sartorius, along with the gracilis and the medial hamstrings, also gives medial knee stability. Because the insertion is below the knee articulation, weakness allows the distal tibia to deviate away from the center line, giving a genu valgus or knock-knee condition.

Alternate Testing Methods: The test is similar to the standard test described above; however, the examiner's hand is placed on the medial knee rather than the lateral. This force does not test the sartorius for lateral thigh rotation, but it does help prevent the patient from bringing the adductor muscles into action, which is sometimes attempted by the patient to give better alignment for the hamstrings to act in knee flexion.

Nerve Supply: Femoral, **L2, 3**

Neurolymphatic:

Anterior: 2" above the umbilicus and 1" from the midline.

Posterior: T11, 12 bilateral near laminae.

Neurovascular: Lambda

NEUROLYMPHATIC


NEUROVASCULAR   STRESS RECEPTOR

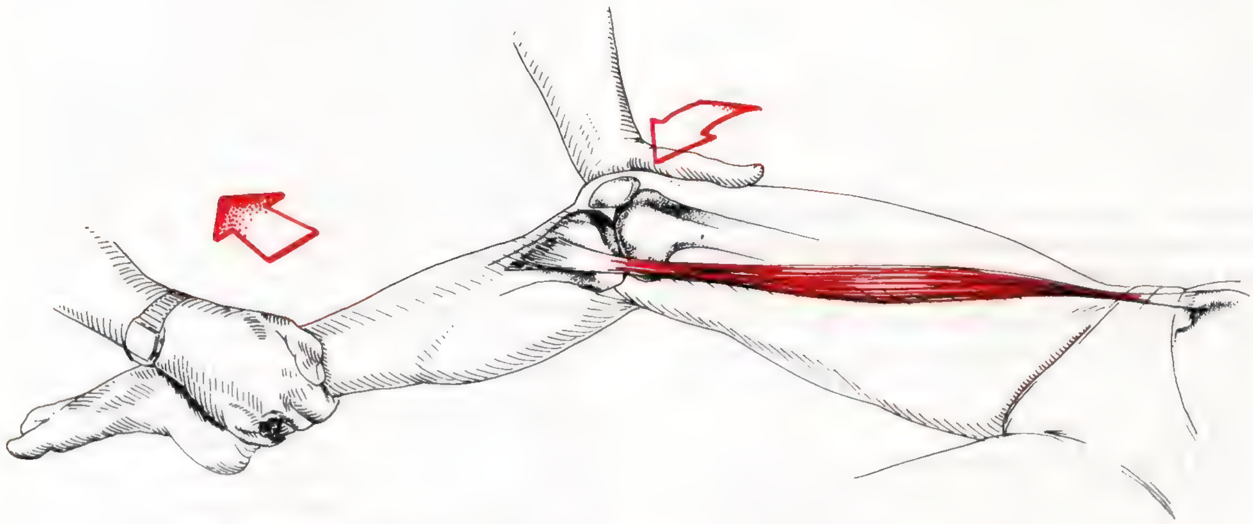
Reactive Muscle Correlation: Anterior tibial and quadriceps.

Nutritional: Adrenal nucleoprotein extract or concentrate, vitamin C, pantothenic acid.

Meridian Association: Circulation sex (occasionally triple heater)

Gland Association: Adrenal

Sartorius (continued)



16—22. Sartorius test, evaluating the lateral thigh rotation, hip and knee flexion capability of sartorius. Examiner tractions at ankle and rotates at knee.

General Discussion: With adrenal weakness, there is often a sacroiliac subluxation of the category II variety. The sartorius is an anterior pelvic stabilizer; consequently, it allows the posterior inferior iliac spine subluxation to develop. When weakness of this muscle, together with gracilis weakness, is responsible for the sacroiliac subluxation, the manipulative correction of the subluxation will often not hold until the muscles are strengthened. Sometimes strengthening the muscle(s) causes the subluxation to be spontaneously corrected by the body. When there is a correlation of this weakness with the subluxation, there will be tenderness at the origin and insertion of the sartorius and/or gracilis, which seems to be a secondary response to the body's vain efforts to correct the subluxation. The sartorius is not electrically active during relaxed standing.[11]

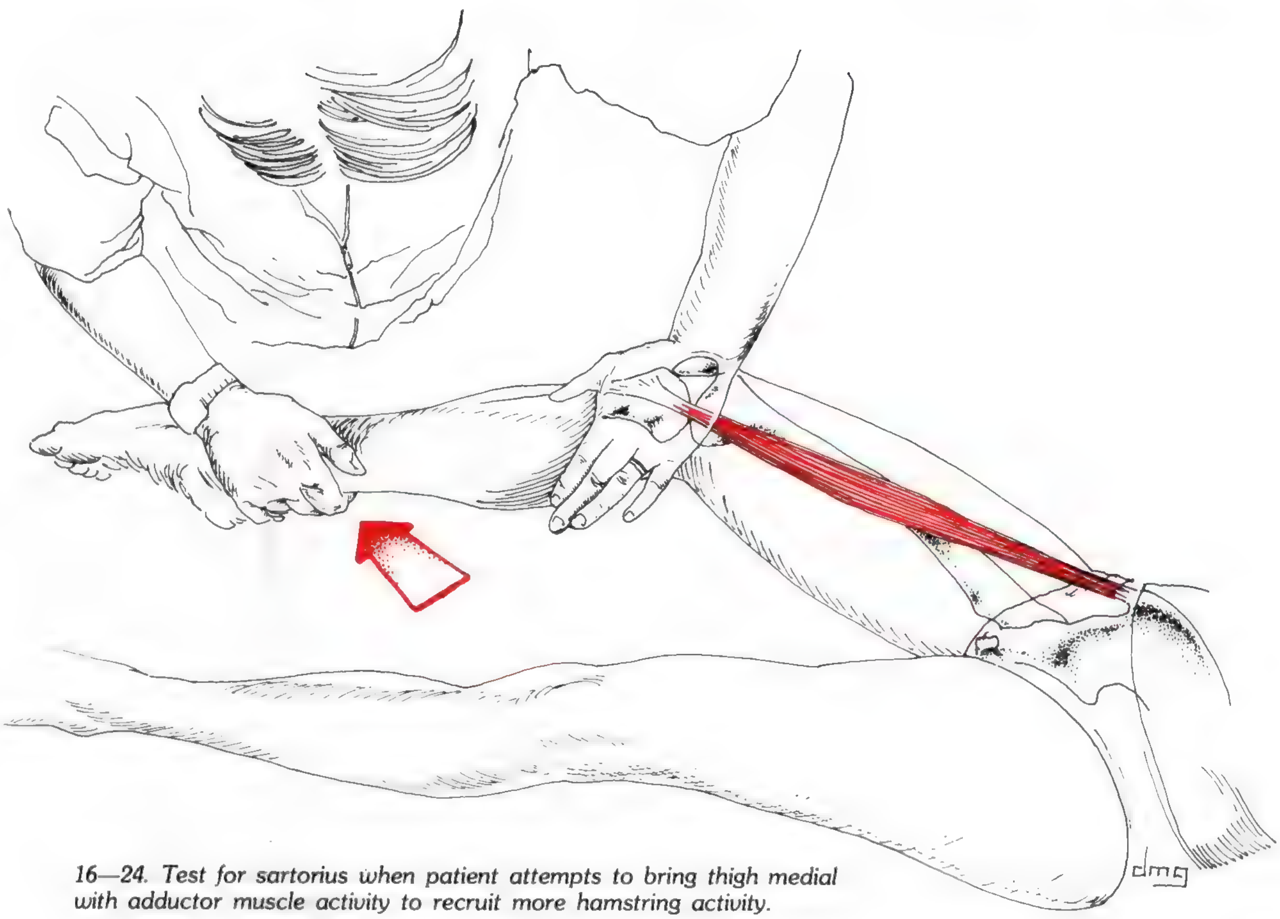
There will often be knee involvements with weakness of this muscle because of the important medial knee stabilization which it provides. When this correlation is present, there will be significant tenderness at the insertion of the sartorius.

Although the sartorius is primarily a knee flexor, electrical activity has been demonstrated during the extensor phase of cycling.[13] This suggests a stabilizing action on the knee during strong extension. With electromyography, Johnson et al.[16] also demonstrated activity of the sartorius during knee extension as well as its usual role of flexion. They attributed to the sartorius the activities of regulating hip flexion and lateral rotation during the swing phase of gait.

In applied kinesiology, the sartorius is a very important muscle for evaluating blood sugar handling stress because of the relationship of the adrenal gland with control of blood sugar. There will often be recurrent sacroiliac subluxations when the patient is exposed to any type of adrenal stress; blood sugar handling stress is only one type.

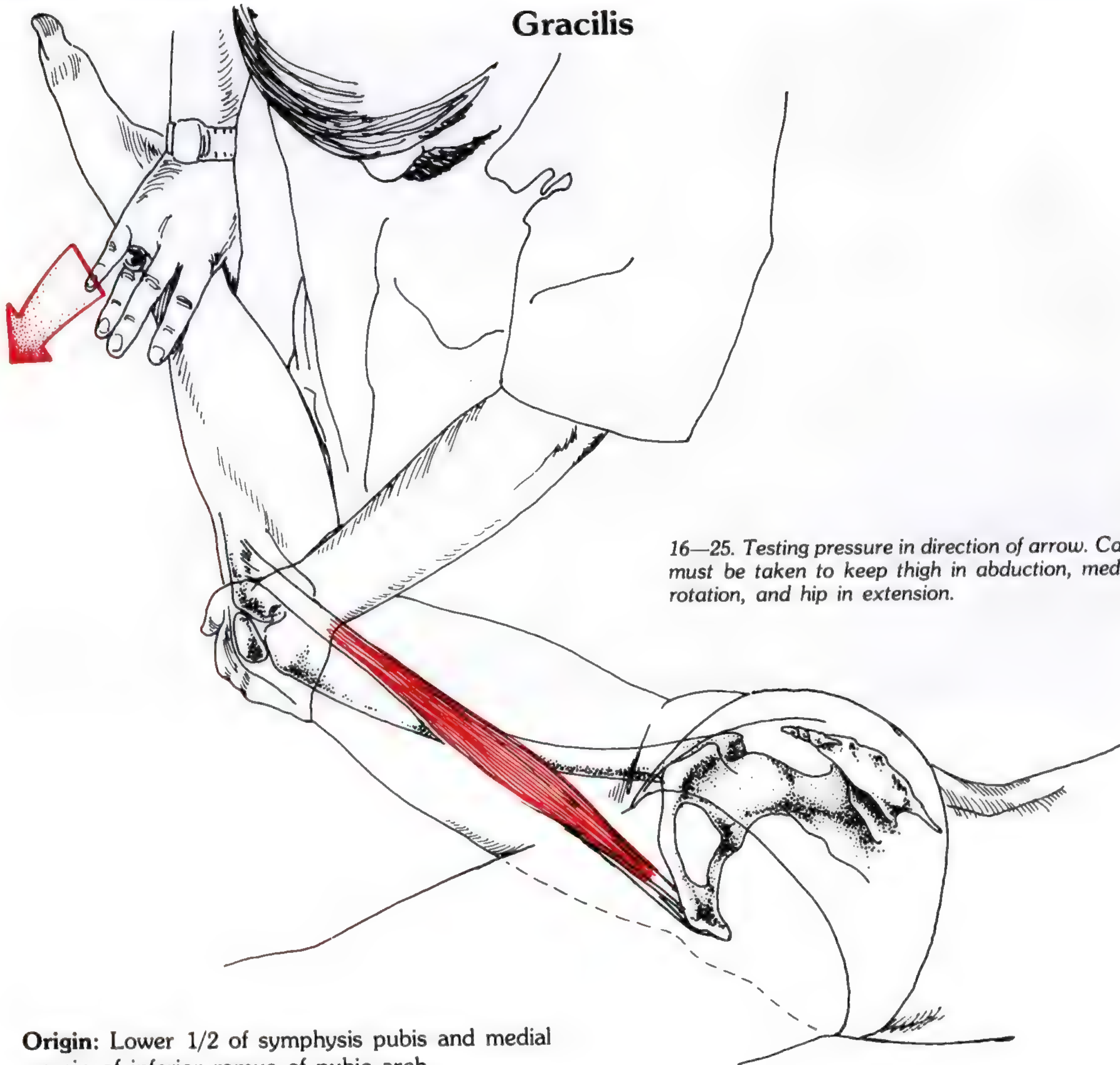
A usual clinical finding regarding the sartorius — and other muscles associated with the adrenal gland in applied kinesiology — is the tenderness present throughout the belly and at the origin and insertion of the muscles in the presence of functional hypoadrenia. It is not unusual to have a patient chew an adrenal supplement, and then immediately observe reduced or abolished tenderness in the muscle belly and at its attachments.

16—23.



16—24. Test for sartorius when patient attempts to bring thigh medial with adductor muscle activity to recruit more hamstring activity.

Gracilis



16—25. Testing pressure in direction of arrow. Care must be taken to keep thigh in abduction, medial rotation, and hip in extension.

Origin: Lower 1/2 of symphysis pubis and medial margin of inferior ramus of pubic arch.

Insertion: Upper part of the medial surface of tibia distal to the condyle.

Action: Adducts thigh, flexes knee and hip, and medially rotates the thigh and tibia.

Reversed Origin-Insertion and Change of Action: When the leg is fixed, flexes the pelvis on the hip.

Testing Position: Prone patient flexes the knee approximately 45°, medially rotating the thigh and abducting the hip. The examiner elevates the knee from the table in hip extension. Because the gracilis originates at the anterior of the pubis, this position helps to segregate the motion from medial hamstrings, which arise from the ischium.

Patient Fixation Requirements: The pelvis must be fixed to the trunk by the abdominal musculature.

Stabilization: The examiner must use two hands in positioning and testing the patient; consequently there is an inability to stabilize the pelvis. In most instances, the patient's pelvis will maintain its position; however, in conditions of weakness, the patient will attempt to tilt the pelvis or rotate it around the vertical axis. This is an effort to recruit the hamstrings more effectively into the testing procedure. The examiner should observe for pelvic shifting by the patient, indicating the probability of a weak gracilis. It may be necessary to have an assistant stabilize the pelvis to prevent the patient from substituting hamstring activity.

Synergists: Sartorius and hamstrings; primarily the semimembranosus and semitendinosus.

Test: Pressure is directed against the posteromedial aspect of the distal leg in a direction of knee extension and slightly lateral to effect medial thigh rotation. It is important that the examiner maintain the thigh in extension and abduction.

Body Language of Weakness:

Testing position: Patient cannot place his leg into the testing position, or hold the position when the examiner lets go.

During test: Patient attempts to adduct the thigh and take it out of extension. This recruits more active synergism of the hamstrings. If the examiner prevents the thigh motion, the patient may rotate and tilt the pelvis to recruit more synergism from the hamstrings.

Postural imbalance: Posterior rotation of the pelvis. The gracilis gives anterior support to the pelvis, but to a lesser extent than the sartorius.

The gracilis gives medial knee support. Since the insertion is below the articulation of the knee, weakness allows the distal tibia to deviate from the midline, giving a genu valgus or knock-knee condition. Because of the structural strain associated with a weak gracilis, there is considerable tenderness at the origin and/or insertion of the muscle.

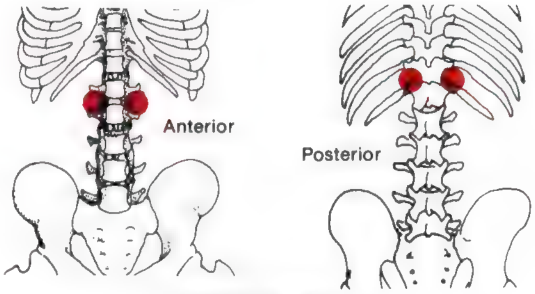
Nerve Supply: Obturator, L2, **3**, **4**

Neurolymphatic:

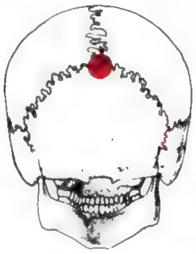
Anterior: 2" above the umbilicus and 1" from the midline.

Posterior: T11, 12 bilateral near laminae.

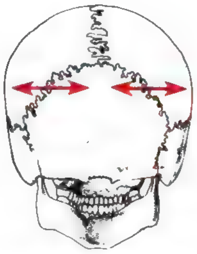
Neurovascular: Lambda



NEUROLYMPHATIC



NEUROVASCULAR



STRESS RECEPTOR

16—26.

Nutritional: Adrenal nucleoprotein extract or concentrate

Meridian Association: Circulation sex (occasionally triple heater)

Gland Association: Adrenal

General Discussion: Along with the sartorius, the gracilis is involved in anterior pelvic stability. Often when these muscles are weak, a sacroiliac subluxation will develop from lack of support. The subluxation will be of a posterior inferior ilium, category II variety.

Knee conditions are common with this muscle involvement. The gracilis is active throughout most of the walking cycle;[11] thus it probably acts as a knee stabilizer throughout each cycle. It is not active electrically in the relaxed standing posture.

The same comments made regarding the sartorius and blood sugar handling stress apply to the gracilis. Both the sartorius and gracilis are difficult muscles to test accurately. If the gracilis is accurately placed into the testing position and the test is performed correctly, it seems to provide better correlation when there is an apparent adrenal dysfunction.

Tensor Fascia Lata

Origin: Anterior part of the outer lip of the iliac crest, anterior border of the ilium.

Insertion: Middle 1/3 of the iliotibial tract of the fascia lata.

Action: Thigh flexion, abduction, and medial rotation. Tenses the fascia lata along with the gluteus maximus, pulling on the iliotibial band and stabilizing the knee laterally.

Testing Position: Supine patient holds leg in a position of abduction, medial rotation, and hip flexion with the knee in hyperextension.

Patient Fixation Requirements: The pelvis must be fixed to the trunk and kept flat on the table. Adequate fixation of the contralateral hip is necessary. The knee should be kept in hyperextension by quadriceps activity.

Stabilization: If the tensor fascia lata is strong, there is little difficulty in obtaining stabilization of the patient's pelvis with the table. In the presence of weakness, there is considerable effort by the patient to recruit synergists by rotating the pelvis. It may be necessary to have an assistant stabilize the pelvis against the table. The examiner stabilizes the opposite leg, helping stabilize the patient on the table.

Synergists: Gluteus medius and minimus and upper fibers of the gluteus maximus.

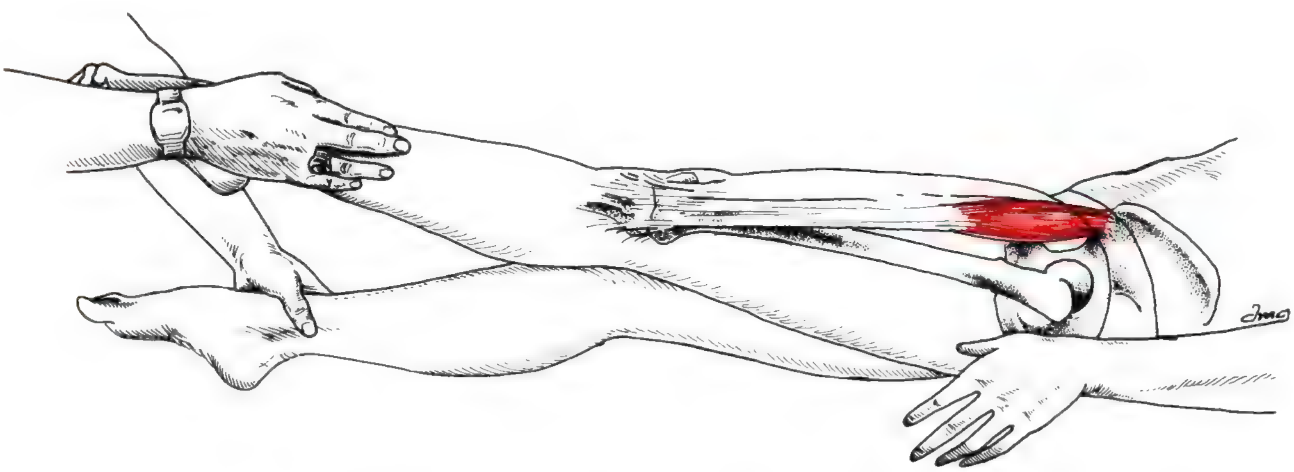
Test: Pressure is directed against the lower leg in a direction of adduction and extension. If the patient has a very heavy leg, the examiner should hold the weight of the leg during the test so the patient need not activate additional muscles to maintain elevation of the leg.

Body Language of Weakness:

During test: Patient will attempt to elevate the pelvis on the side of test to attempt to recruit more synergistic activity from the gluteus medius and minimus. When weakness is present, the patient will frequently attempt to flex the knee, changing the parameters of the test.

Postural balance: Standing patient will show a genu varus or bowleg condition. The tensor fascia lata, along with the gluteus maximus, gives lateral knee support by way of the iliotibial band. Because the iliotibial band inserts below the knee on the lateral condyle of the tibia, lack of support allows the distal aspect of the tibia to deviate toward the midline of the body. There will also be pelvic elevation on the weak side when the patient is viewed from anterior to posterior or posterior to anterior.

Alternate Testing Methods: The tensor fascia lata can be tested in the weight-bearing position by having the patient lean against an upright hi-lo table. The test is performed in the same manner as in the supine position.



16—27. In the tensor fascia lata test, the pressure is directed medial to just anterior of the opposite ankle.

16—28. Anterior

16—29. Lateral

Tensor Fascia Lata (continued)

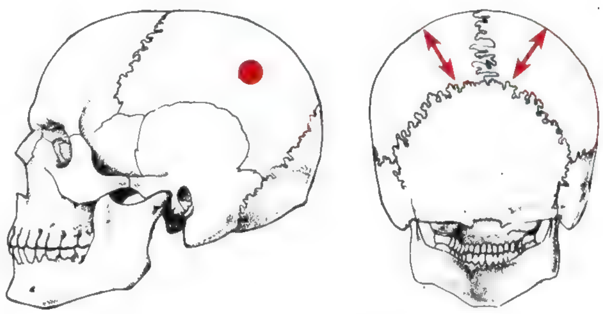
16—30. Knee is maintained in extension and thigh in medial rotation.

Nerve Supply: Superior gluteal, **L4, 5, S1**

Neurolymphatic:

Anterior: anterolateral thigh bilaterally. This neurolymphatic reflex is divided into sections correlating with the sections of the large intestine. Right leg: upper portion, cecum; middle 3/5, ascending colon; lower portion, first portion of transverse colon. Left leg: lower portion, last 3/5 of transverse colon; lower middle portion, descending colon; upper middle portion, upper sigmoid colon; upper area, junction of sigmoid colon with rectum.

Posterior: Triangular area with apexes at L2, L4, and the crest of the ilium.



NEUROVASCULAR | STRESS RECEPTOR

Neurovascular: Parietal eminence at the posterior aspect.

Reactive Muscle Correlation: Adductors, peroneus tertius.

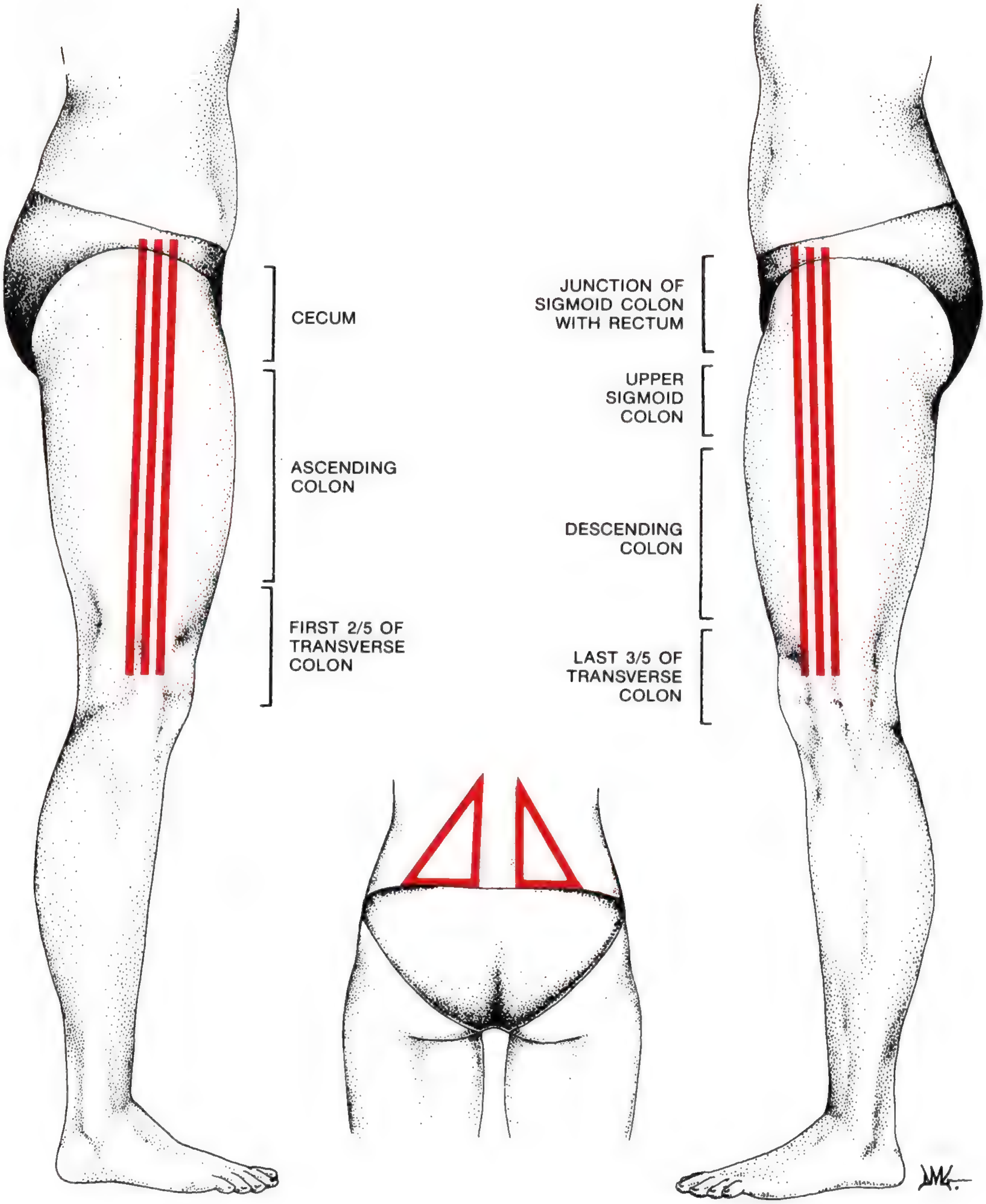
Nutritional: Acidophilus, fenugreek, and comfrey, vitamin D. If bilateral, evaluate for iron deficiency anemia.

Meridian Association: Large intestine

Organ Association: Large intestine

General Discussion: When the tensor fascia lata is involved with colon dysfunction, there is often severe lymphatic congestion. Prolonged reflex stimulation may be required. It may sometimes be of value to have the patient stimulate the reflexes at home. The best cooperation is generally obtained by having the patient stimulate the reflex while bathing or showering, using soap as a lubricant.

When severe involvement is present, usually with a bilaterally weak tensor fascia lata, there is often an iron deficiency anemia. Paradoxically, the anemia will sometimes be that of polycythemia, which is treated with homeopathic dosages of iron formulations and produces good clinical results.



16—31. Neurolymphatic reflex for tensor fascia lata and colon.

Adductors

PECTINEUS

Origin: Superior surface of the pubis between iliopectineal eminence and pubic tubercle.

Insertion: Pectineal line from lesser trochanter to linea aspera.

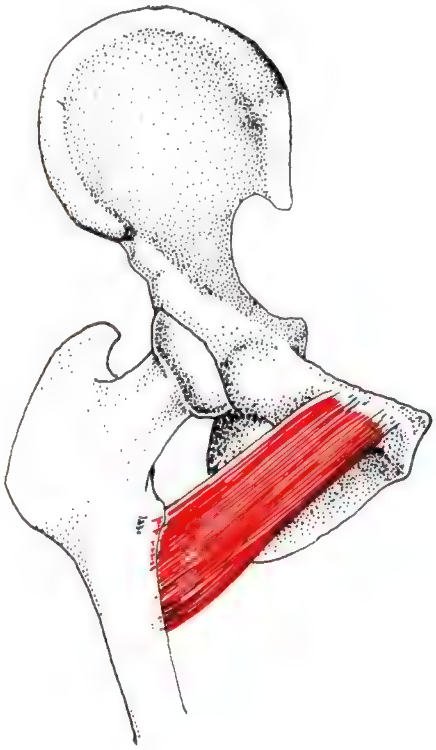
Action: Adduction, flexion, and medial rotation of the thigh.

ADDUCTOR BREVIS

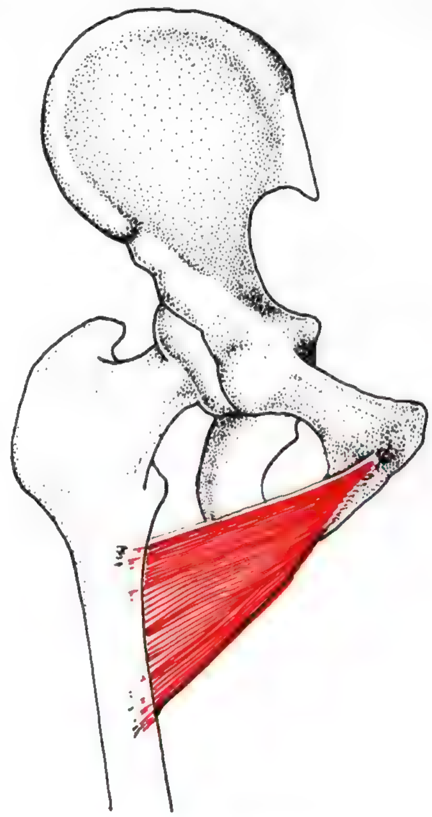
Origin: Outer surface of inferior ramus of pubis.

Insertion: On a line extending from lesser trochanter to linea aspera.

Action: Hip adduction, with some assistance in hip flexion.



16—32. Pectineus



16—33. Adductor brevis

ADDUCTOR LONGUS

Origin: Anterior of pubis in angle between crest and symphysis.

Insertion: Middle 1/3 of medial lip of linea aspera.

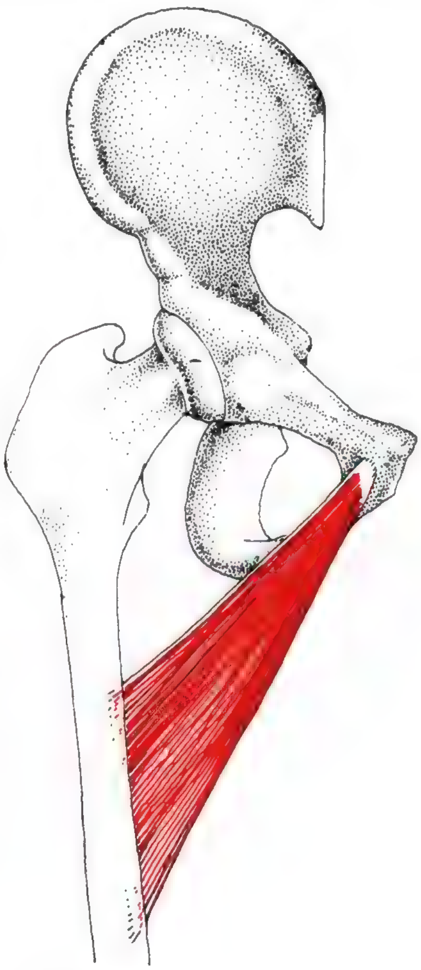
Action: Adducts thigh with some assistance in hip flexion.

ADDUCTOR MAGNUS

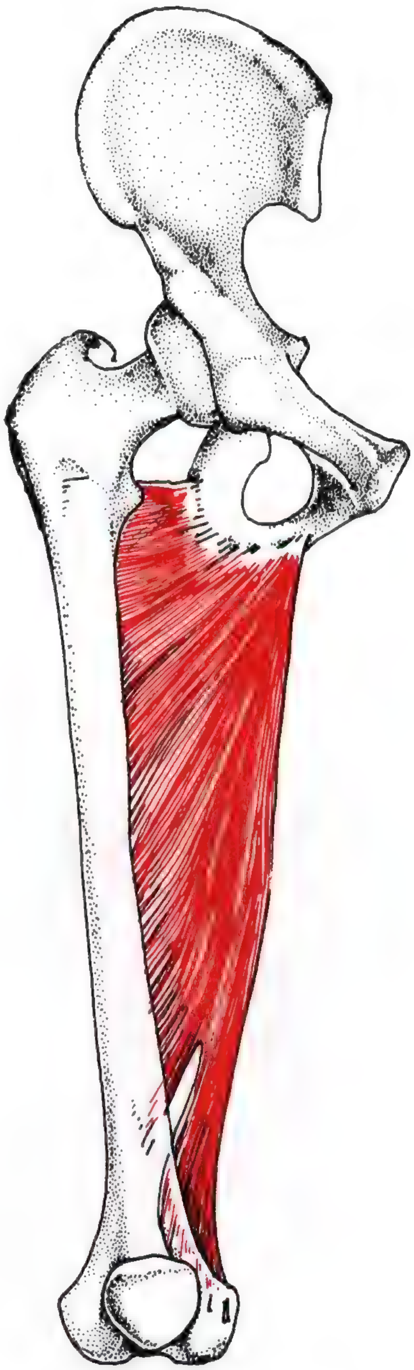
Origin:
Posterior fibers: ischial tuberosity
Anterior fibers: ramus of ischium and pubis

Insertion: From a line extending from the greater trochanter along linea aspera, medial supracondylar line, and ending at the adductor tubercle of the medial condyle of the femur.

Action: Adduction in combination with other hip adductors. Fibers arising from ischium and ramus of ischium primarily insert distally and aid in hip extension. Fibers arising from ramus of pubis insert proximally and aid in hip flexion.

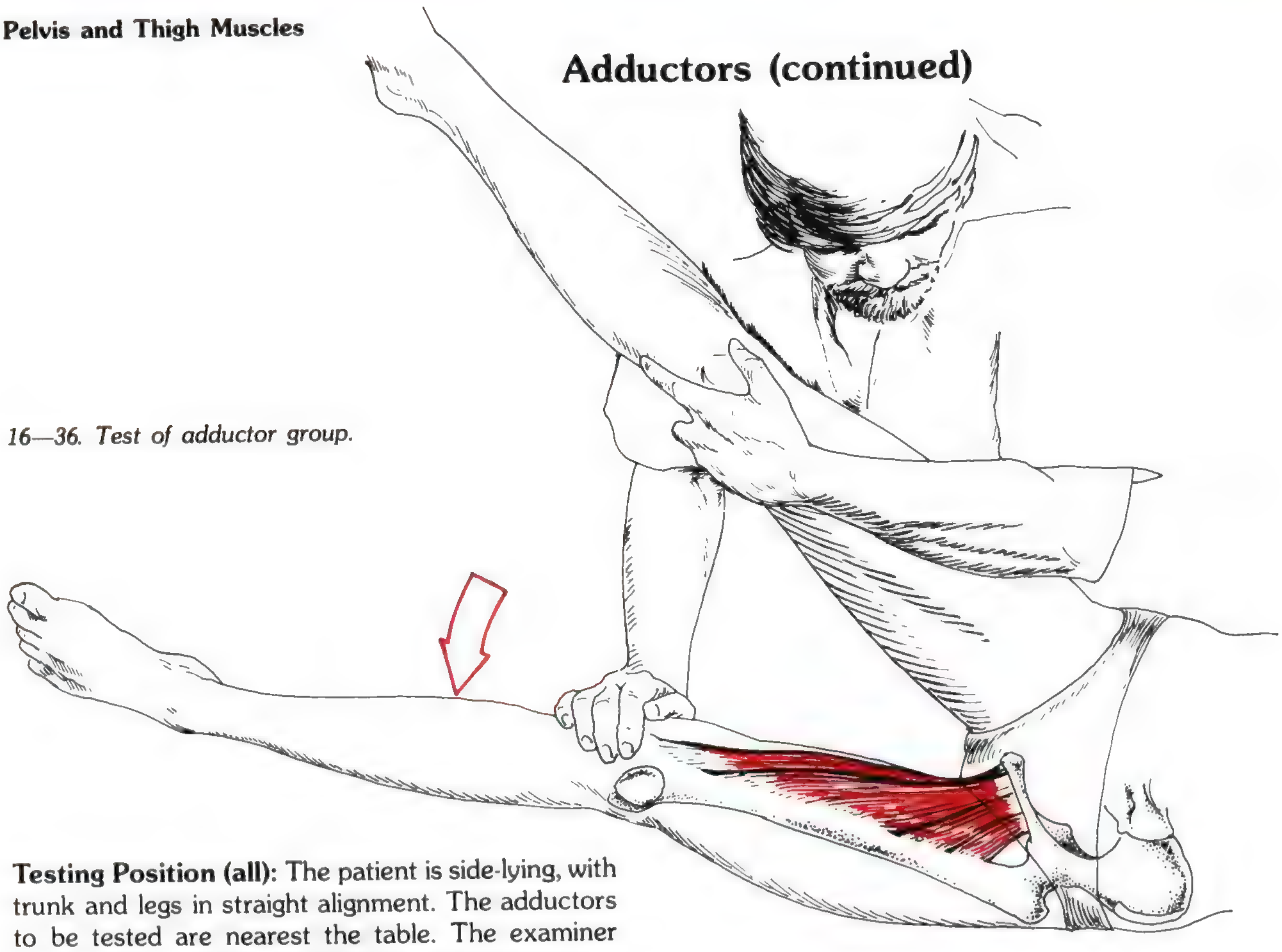


16—34. Adductor longus



16—35. Adductor magnus

Adductors (continued)



16—36. Test of adductor group.

Testing Position (all): The patient is side-lying, with trunk and legs in straight alignment. The adductors to be tested are nearest the table. The examiner elevates the leg furthest from the table to give room for hip adduction on the tested side. As the examiner elevates the non-involved leg, he watches to make certain there is no pelvic rotation around the central axis. The leg to be tested (nearest the table) is then adducted past the body's midline without hip rotation, flexion, or extension. The examiner continues to watch the pelvis to prevent rotation or tilting.

Patient Fixation Requirements: The muscles responsible for fixation of the pelvis to the trunk on the contralateral side must be functioning normally. These include the quadratus lumborum, internal and external oblique abdominals, and sections of the sacrospinalis. This fixation does not usually cause a problem because the examiner — holding the contralateral leg — assists in the maintenance of pelvic stabilization. However, the examiner must observe, in the presence of apparent adductor weakness, that motion is actually taking place at the hip on the side being tested rather than failure of fixation of the contralateral pelvis with the trunk.

Stabilization: Because the examiner is required to hold the contralateral leg, it is difficult to stabilize the pelvis to prevent tilting and rotation. It is sometimes necessary to have an assistant help with this. The patient can stabilize the trunk by holding the edge of the table.

Synergist: Gracilis

Test: While stabilizing the contralateral leg in the abducted position, the examiner directs force to the leg next to the table at the medial aspect of the knee in a direction to abduct the adducted leg, taking it toward the examination table.

Body Language of Weakness:

Testing position: Patient attempts to rotate pelvis around the vertical axis to change the parameters of the test.

During test: Same pelvic rotation attempt as is observed in the testing position. There should be a slight hip flexion attempt by the patient if the adductors are the prime movers. Hip extension during the test indicates recruitment of the inferior portion of the gluteus maximus for more synergistic activity. Without hip extension, the inferior portion of the gluteus maximus is not a hip adductor.[11]

Postural imbalance: Lateral sway when standing in a neutral position.

Alternate Testing Methods: The test can be accomplished in the supine position. The examiner stabilizes the opposite leg and directs force against the medial aspect of the ankle in a direction to abduct

the hip. Fixation of the stabilized leg to the pelvis is necessary by the patient's strong adductors on the non-tested side. The examiner should be careful not to allow pelvic tilting or rotation. Rotation of the pelvis may be evidence of attempted recruitment of the inferior fibers of the gluteus maximus.

Nerve Supply:
Pectineus: femoral and obturator nerves, **L2, 3,** 4
Adductor magnus: obturator and sciatic, L2, **3, 4,** 5, S1
Adductor longus: obturator, L2, **3,** 4
Adductor brevis: obturator, L2, **3, 4**

Neurolymphatic:
Anterior: behind areola
Posterior: below inferior angle of scapula

Neurovascular: On lambdoidal suture between lambda and asterion.

Reactive Muscle Correlation: Psoas, tensor fascia lata

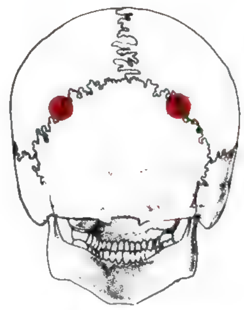
Nutritional: Vitamin E, endocrine concentrates or nucleoprotein extracts, usually of some aspect of the reproductive system.

Meridian Association: Circulation sex

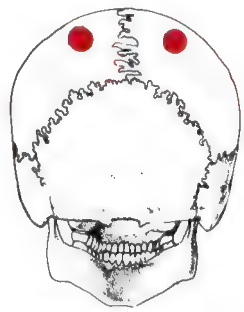
Organ-Gland Association: Climacteric. Reference to climacteric indicates a wide range of potential involvements, including the reproductive organs and glands, adrenal, liver, pituitary, and thyroid. The interplay of the endocrine system is responsible for this wide range of associations.

General Discussion: Weakness of the adductors is quite frequently associated with epicondylitis. The correlation to epicondylitis in the elbow (tennis elbow) may be due to the fact that playing tennis is a side-thrusting activity which requires considerable adductor utilization. It is interesting to note that the neurolymphatic reflexes found to affect the adductor muscles are behind the areola and at the inferior angle of the scapula. These are reflexes which affect the adductors and also commonly drain the arm.

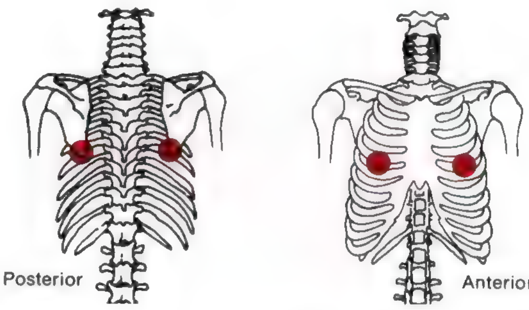
The adductor magnus and adductor longus have generally been listed as lateral rotators, but they have been found to be active during medial rotation.[21] In the relaxed standing position, both muscles are electrically inactive.



NEUROVASCULAR



STRESS RECEPTOR



NEUROLYMPHATIC

16—37.

Gluteus Medius — Gluteus Minimus

GLUTEUS MEDIUS

Origin: Outer surface of ilium from iliac crest and posterior gluteal line above, to anterior gluteal line below, gluteal aponeurosis.

Insertion: Lateral surface of greater trochanter.

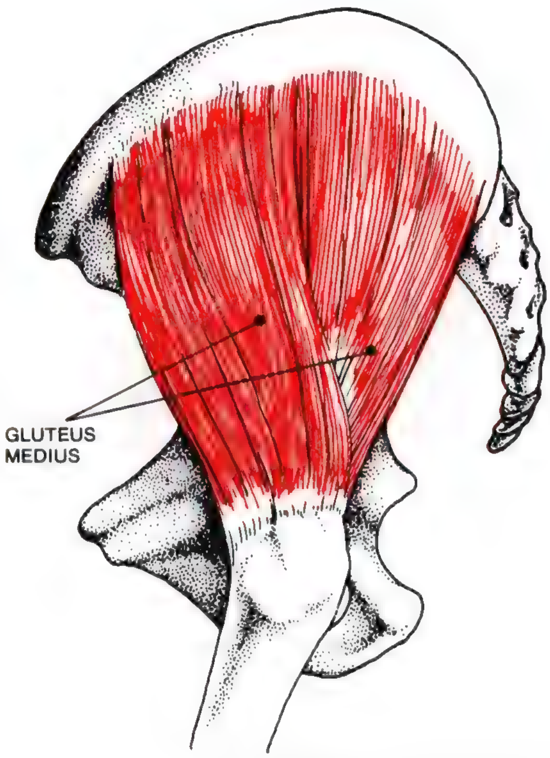
Action: Abducts thigh and rotates it medially. With gluteus minimus is major lateral pelvic stabilizer. Aids in early activity of hip flexion.

GLUTEUS MINIMUS

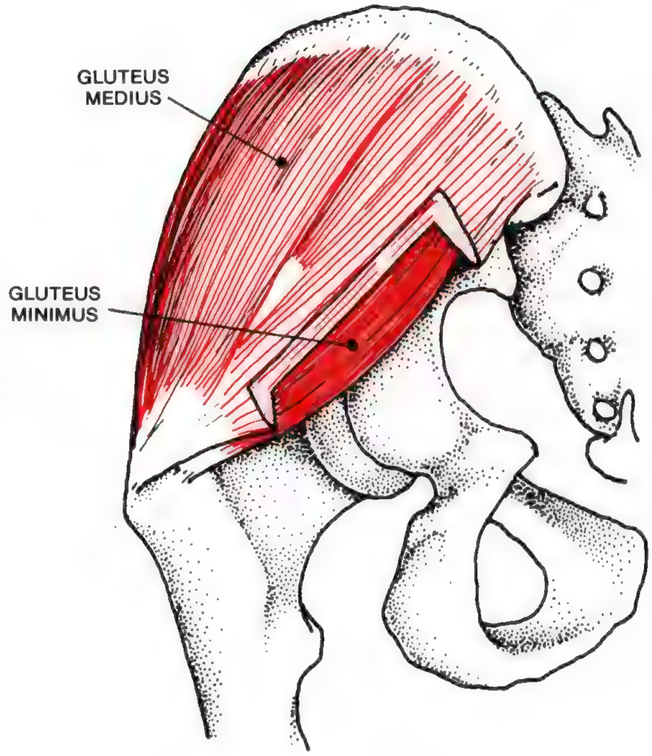
Origin: Outer surface of ilium between anterior and inferior gluteal lines and margin of greater sciatic notch.

Insertion: Anterior border of greater trochanter.

Action: Abducts thigh and rotates it medially, assists gluteus medius in most functions.



16—38.



16—39.

Testing Position: Generally the gluteus medius and minimus are tested simultaneously. The preferred position is side-lying, although the muscles can be tested in the supine position if the examiner carefully observes and controls the test to prevent substitution and support.

The side-lying patient flexes hip and knee of lower non-tested leg for stability. Patient abducts hip with slight extension, keeping knee extended.

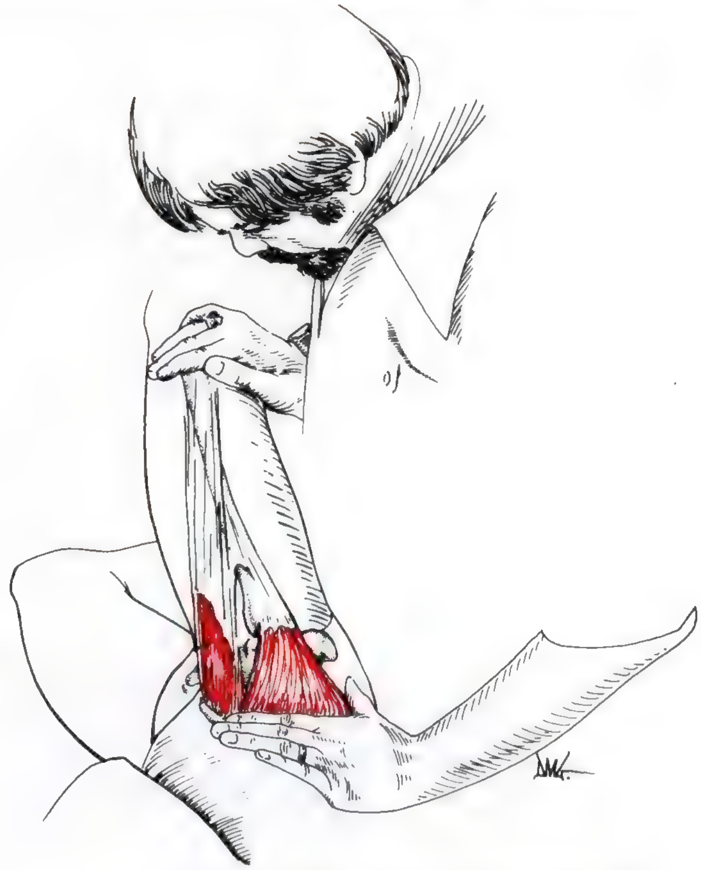
Patient Fixation Requirements: The pelvis must be adequately fixed to the trunk by the abdominal muscles, quadratus lumborum, and sacrospinalis.

Stabilization: The examiner's greatest challenge in testing the gluteus medius and minimus is stabilizing the pelvis and making certain there is adequate fixation by the patient's muscles. The examiner should stabilize the pelvis to prevent rotation around the vertical axis. If the patient fails to fix the pelvis to the trunk, the examiner will have to increase his stabilization to avoid inferior displacement of the pelvis on the side of muscle test.

Synergists: Tensor fascia lata, upper 2/3 of gluteus maximus.

Test: The examiner contacts the lateral aspect of the knee or the ankle, depending on the amount of leverage desired. Pressure is directed toward the table in a direction of adduction and slight extension.

16—40. Correct position for gluteus medius-minimus test. Note slight hip extension.



16—42. This improper position for gluteus medius-minimus test aligns the tensor fascia lata to be the prime mover.

16—41. Good test.

16—43. Poor test.

Gluteus Medius — Gluteus Minimus (continued)

Body Language of Weakness:

Testing position: As the patient goes into the testing position, he will attempt to rotate the pelvis posterior on the side being tested if the gluteus medius and minimus are weak. If there is a tendency to rotate the pelvis around the vertical axis, the examiner must stabilize the pelvis as the patient goes into the testing position.

During test: Patient will continue to attempt posterior rotation of the pelvis around the vertical axis to obtain substitution of the tensor fascia lata. Contraction of the hip flexors tilts the pelvis posteriorly to align the fibers of the tensor fascia lata for better synergistic activity.

Movement aberrations: The patient will have a positive Trendelenburg test, and there will be a typical gluteus medius limp. The gluteus medius limp is observed on the weak side when the patient is weight bearing; there is a drooping of the contralateral pelvis from lack of gluteus medius and minimus support on the weak side. The drooping of the pelvis causes the leg opposite weakness to be thrown laterally through its swing.

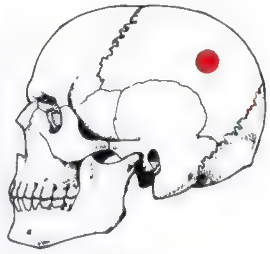
Postural imbalances: There will be a high pelvis, shoulder, and head on the side of weakness.

Alternate Testing Position: The patient can be tested in a supine position with the same basic mechanics observed as those in the side-lying position. The greatest difficulty in testing a patient in this position is the inability to stabilize the pelvis. The examiner must be aware of pelvic shifts the patient

16—44. Gluteus medius and minimus test.

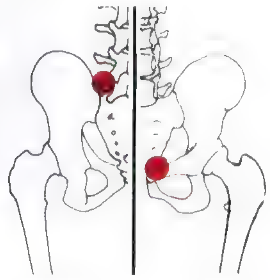
16—45. Patient has rotated pelvis to recruit additional activity of the tensor fascia lata. This gross change of position is not easily observed from the examiner's viewpoint.

16—46. Weight-bearing gluteus medius and minimus test. Accurate stabilization of pelvis is necessary to obtain accurate information.



NEUROVASCULAR

STRESS RECEPTOR



NEUROLYMPHATIC

makes to improve synergistic action, as well as his ability to provide adequate fixation to the pelvis on the trunk. If there is difficulty in keeping the patient's pelvis in the correct position — or if there is inadequate fixation — the examiner should test the gluteus medius and minimus in the side-lying position, or in the standing position against an upright hi-lo.

To obtain weight-bearing information about the gluteus medius and minimus, the muscle test can be done in the standing position. It is best to do the standing test with the patient stabilized against an upright adjusting table. If this is not available, the evaluation usually requires an assistant to help stabilize the patient's pelvis and trunk for adequate testing.

Nerve Supply: Superior gluteal, **L4, 5, S1**

Neurolymphatic:
- **Anterior:** upper symphysis pubis
- **Posterior:** between posterior superior iliac spine and L5 spinous process

Neurovascular: On parietal eminence, posterior aspect.

Reactive Muscle Correlation: Contralateral rectus abdominis

Nutritional: Vitamin E, male or female endocrine nucleoprotein extracts or concentrates.

Meridian Association: Circulation sex

Organ-Gland Association: Reproductive organs and glands.

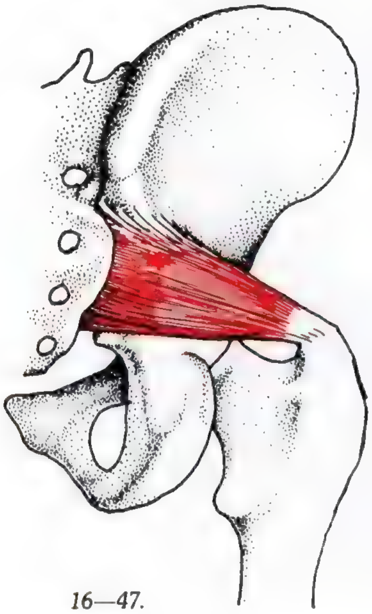
General Discussion: In the relaxed standing position, the gluteus medius and minimus are inactive on electromyography. During gait, there is activity during the supporting phase.[11, 21]

In applied kinesiology, it is very important to evaluate the gluteus medius when there is endocrine imbalance, especially problems with the reproductive system. It is often necessary to test the muscles weight-bearing to observe weakness.

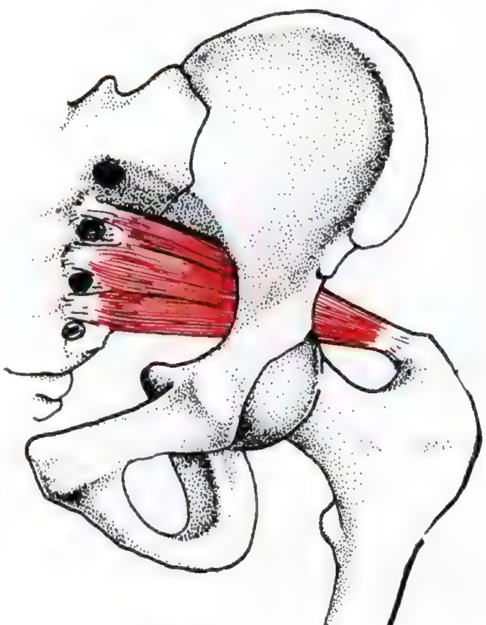
Piriformis

Origin: Anterior surface of sacrum between — and lateral to — anterior sacral foramen, capsule of sacroiliac articulation, margin of greater sciatic foramen, and sacrotuberous ligament.

Insertion: Superior border of greater trochanter of femur.



16—47.



16—48.

Action: Rotates thigh laterally, abducts thigh when limb is flexed.

Testing Position: Prone patient flexes knee to 90° and laterally rotates thigh.

Stabilization: The lower leg is used as a lever to impart rotation to the femur. The examiner should stabilize the thigh at the knee to impart rotational motion into the femur only, preventing femur abduction. Normally the patient's weight is adequate for stabilizing the pelvis. The examiner should observe for this stabilization, which means no rotation around the vertical axis. If the pelvis does not lie flat on the table, it may be necessary to have an assistant stabilize it to get accurate information from the muscle test.

Synergists: Superior and inferior gemellus; quadratus femoris; internal and external obturators.

Test: Pressure is directed toward the medial distal end of the leg in a direction to cause medial thigh rotation. The most common error is failure to observe for pelvic stabilization and provide it if necessary.

Body Language of Weakness:

During test: Patient rotates pelvis about the vertical axis by raising opposite hip from table. There is sometimes an effort to change the test parameters by flexing or extending the knee.

Movement aberrations: Patient may experience pain or have difficulty in placing an ankle on the opposite knee when sitting because of hypertonicity on one side and probable weakness on the opposite. When this happens, check the pectineus for hypertonicity and evaluate the hamstrings on the side of involvement.

Postural imbalance: Medial thigh rotation on side of weakness, and generally lateral thigh rotation on opposite side.

Alternate Testing Methods: The piriformis can be tested in the supine or seated position. When testing in the supine position, the hip and knee are flexed to 90°. The examiner directs pressure to the medial ankle and stabilizes the knee, imparting medial rotation to the thigh. The patient may attempt to change the parameters of the test by flexing or extending the knee, as in the prone test. The sitting test is done in a similar manner.

A weight-bearing test can be accomplished with the patient on hands and knees, with the knees flexed approximately 90°. Patient rotates thigh laterally, and the examiner stabilizes it with pressure above the knee on the lateral aspect. Pressure is directed against the medial-distal leg in a direction to

16—49. Prone piriformis test.

cause medial thigh rotation, while the patient resists (see page 87, illustration 7—3).

Nerve Supply: Sacral plexus, L5, **S1, 2**

Neurolymphatic:
  Anterior: upper symphysis pubis.
  Posterior: between posterior superior iliac spine and L5 spinous.

Neurovascular: On parietal eminence, posterior aspect

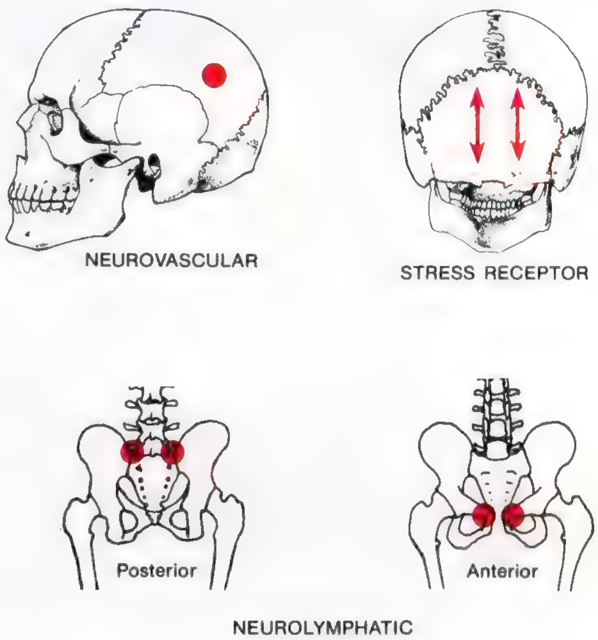
Reactive Muscle Correlation: Contralateral splenius capitis

Nutritional: Vitamin A, male or female endocrine concentrates or nucleoprotein extracts

Meridian Association: Circulation sex

Organ Association: Reproductive organs or glands

General Discussion: The piriformis is a very important stabilizing muscle to the sacrum. It is usually involved when there are sacral subluxations, fixa-



Piriformis (continued)

16—50. Piriformis test, seated.

tions, or sacral respiratory faults; if weak or hypertonic, it usually requires treatment to obtain lasting correction of sacral dysfunction.

The piriformis is one of the few muscles to cross the sacroiliac articulation. It is clinically observed that there is a tendency for piriformis hypertonicity when there are fixations of the sacroiliac, and weakness when there is a subluxation.

In addition to applied kinesiology's observation that the piriformis is a primary sacral stabilizer, Rolf[29] points out that an imbalance of the sacrum and pelvis by way of the piriformis causes a link to rotation of the thigh which may result in compensatory distortion, ultimately affecting the entire body. Attention to the muscle alone is not an adequate therapeutic approach; any pelvic or other structural distortions present in compensation must be corrected.

Clinical observation reveals a common weakness of the piriformis on one side and hypertonicity on the opposite. When this is present, the weak side is usually primary. Strengthening it with usual AK methods is a significant step in releasing the hypertonic piriformis.

When there is difficulty in obtaining correction of piriformis weakness, it may be necessary to use the uterine lift technique and give attention to the levator ani muscle (described in Volume V of this series). It is occasionally necessary to treat the origin area of the piriformis. When this is necessary, the avenue of approach is through the rectum.

The piriformis and its relationship with the sacroiliac and sciatic neuralgia have been given considerable attention. Illi,[14] when discussing unilateral subluxation of the pelvis, is actually relating to a fixation

when put into perspective with the terminology presented in this text under "Subluxations" and "Fixations." He relates the contraction of the piriformis as a consequence of a unilateral subluxation (fixation) of the pelvis. This may be true in some cases, causing perpetuation of the sacroiliac fixation. Clinical evidence in applied kinesiology seems to give causative responsibility for the fixation to the hypertonic piriformis muscle. This seems so because in many instances when a hypertonic piriformis is returned to normal, the indicators for a fixation may disappear without manipulation. It seems to be a question of which came first, the chicken or the egg.

Involvement of the piriformis may cause a sciatic neuralgia. The sciatic nerve relationship with the piriformis muscle varies considerably. In some cases, one or both parts of the sciatic nerve can perforate the piriformis, while in others it passes above or below the muscle; it may even split and pass around the muscle.[15, 20] There is considerable disagreement as to how the piriformis irritates the sciatic nerve.[15, 18, 24] Some attribute the irritation to contraction of the piriformis, while others consider the piriformis weak or in a stretched state. The disagreement is probably due to the great amount of anatomical variation of the muscle and its relationship with the sciatic nerve. The applied kinesiology approach for evaluating the sacroiliac articulation and muscular balance of the entire pelvis produces excellent results.

The piriformis muscle and its relationship with sciatic neuralgia has been correlated by Maxwell[24] as being present when the sciatic neuralgia is on the apparent long-leg side. He states that the piriformis will be hypertonic on the long leg-sciatic neuralgia side, and must be relaxed.

Interference with reproductive function has been indicated by Retzlaff et al.[28] This is attributed to influence on the pudendal nerve and blood vessels. Symptomatically, it causes pain on coitus in the female and impotence in the male.

A full discussion of differential diagnosis and treatment procedures for the piriformis syndrome is presented in Volume IV of this series. In most cases, general structural corrections and attention to balancing all the pelvic muscles produce correction of the syndrome.

16—51. Piriformis supine test.

Gluteus Maximus

Origin: Posterior gluteal line of ilium, tendon of sacrospinalis, dorsal surface of sacrum and coccyx, and sacrotuberous ligament.

Insertion: Gluteal tuberosity of femur and iliotibial tract of fascia lata.

Action: Extends hip, assists in laterally rotating the thigh. The upper and middle-third sections of the muscle are abductors, and the lower third is inactive as an abductor or an adductor in the standing position.[11]

Reversed Origin-Insertion and Change of Action: When the leg is fixed, as in standing, the gluteus maximus is an extensor of the pelvis on the thigh. In this case it is a synergist to the abdominal muscles.

Testing Position: The prone patient flexes his knee 90° or more and extends the hip to the maximum amount. The testing position is very important.

Patient Fixation Requirements: The back extensor muscles and the abdominal muscles must fix the pelvis to the trunk.

Stabilization: The patient's body weight typically provides adequate stabilization; however, the examiner must stabilize the pelvis if the patient attempts to rotate it around the vertical axis.

Synergist: Hamstrings, which are placed at a disadvantage by knee flexion.

Test: Pressure is directed on the distal 1/3 of the femur in a direction of hip flexion. The examiner should observe for adequate fixation of the pelvis to the trunk by the trunk extensors and oblique abdominal musculature.

16—52.

16—53.

Body Language of Weakness:

Testing position: Considerable information is gained as the patient goes into the testing position. In the presence of weakness, he may attempt to rotate the pelvis around the vertical axis, lifting it from the table on the side of test to aid in lifting the thigh from the table. Another indication of weakness is a change of knee flexion by the patient. Even though the examiner may have placed the knee in adequate flexion, the patient may attempt to extend it to recruit synergistic action of the hamstrings. Weakness may be evident by an inability to reach or maintain the testing position.

During test: Continued improper effort, such as that used in an attempt to hold the testing position, will be observed. The patient will attempt to straighten the leg from the flexed position, and to rotate the pelvis.

Movement aberrations: Difficulty in arising from a chair, or in arising from the standing hip flexion position (Adams position).

Postural imbalance: Anterior rotation of the pelvis, or the patient carries the weight of the trunk posteriorly on a posteriorly rotated pelvis in an attempt to compensate for the weakness. In either the standing or the prone position, a weak gluteus maximus may be observed by the atonic appearance of the muscle. In the prone position, there is a lack of firmness and roundness of the gluteus maximus. In the standing position, the gluteus maximus appears to sag.

Alternate Testing Method: In the presence of a short rectus femoris, it is necessary to test the gluteus maximus with less knee flexion. The shortened rectus femoris is observed when the thigh cannot be raised from the table with knee flexion; it can raise adequately when less flexion is present. An improvement in the length of the rectus femoris can often be obtained by the fascial release or the spray and stretch technique.

The gluteus maximus is frequently tested in the weight-bearing position to evaluate for an upper

Gluteus Maximus (continued)

16—54. Weight-bearing gluteus maximus test. Note that without stabilization the pelvis is rotating, which may cause inaccurate information to be obtained from the test.

cervical fixation which appears only when weight bearing. The test is generally accomplished against an upright hi-lo table, and it is done in a manner similar to the prone test. If a hi-lo table is not available, the test can be done by stabilizing against a wall; however, it is more difficult to obtain accurate information.

Nerve Supply: Inferior gluteal, L4, **5, S1, 2**

Neurolymphatic:
Anterior: anterolateral thigh
Posterior: between posterior superior iliac spine and L5 spinous.

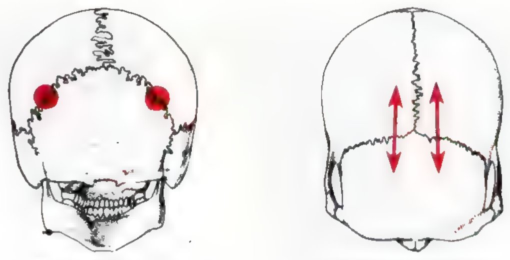
Neurovascular: On the lambdoidal suture midway between lambda and asterion.

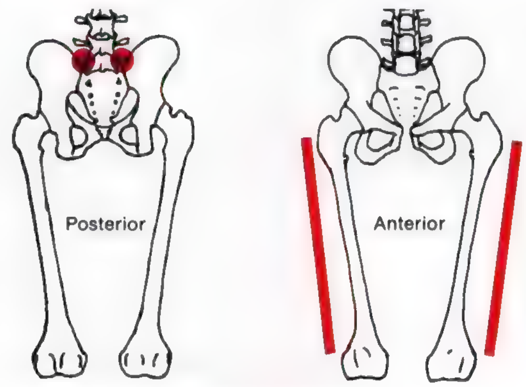
Reactive Muscle Correlation: Sacrospinalis, pectoralis major (clavicular division)

Nutritional: Vitamin E, male or female endocrine concentrates or nucleoprotein extracts

Meridian Association: Circulation sex

Organ-Gland Association: Reproductive organs or glands





16—55. Patient will tend to straighten leg to recruit more hamstring synergism.

16—56. Maximum knee flexion may limit hip extension if the rectus femoris is short. The position helps take the hamstrings out of the test.

General Discussion: Bilateral gluteus maximus weakness is the indicator for functional upper cervical fixation. Correction of the fixation will cause immediate strengthening of the bilateral weakness.

The gluteus maximus inserts into the iliotibial tract of the fascia lata, consequently providing some lateral knee stabilization.

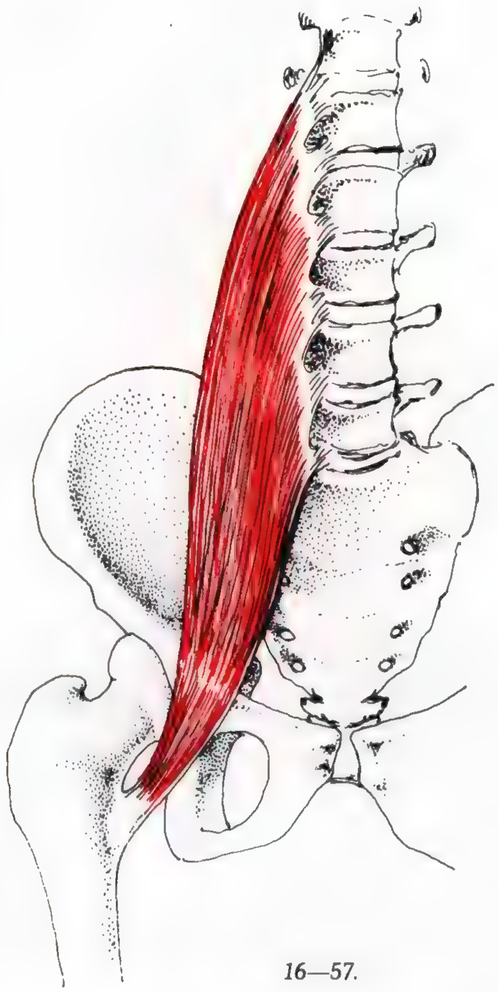
It is often clinically observed that the gluteus maximus is weak on one side and hypertonic on the other. In the presence of hypertonicity, the Lasegue sign may be positive, indicating sciatic nerve involvement. Balancing of the gluteus maximus muscles often removes this positive sign immediately. The usual approaches are used to balance the muscles. In the case of the hypertonic gluteus maximus, it is sometimes necessary to use a deep, heavy pressure in the belly of the muscle; the pressure is held until relaxation is observed. Spray and stretch and fascial release techniques are also of value.

In the relaxed standing position, the gluteus maximus is not active as observed on electromyography.[11, 17] This lack of activity is even observed during forward swaying of the body. The muscle is active when arising from the toe-touching position. Gluteus maximus paralysis does not disturb walking, even though the muscle normally shows phasic activity.[21]

Psoas

Origin: Anterior surface of transverse processes, lateral border of vertebral bodies and corresponding intervertebral discs T12 through L5.

Insertion: Lesser trochanter of the femur with the iliacus.



16—57.

Action: Flexes and gives minimal action in lateral rotation and abduction of the thigh (see page 304).[1]

Reversed Origin-Insertion and Change of Action: With the insertion fixed, laterally flexes spine, or acting bilaterally, flexes spine or increases curve of the lumbar lordosis (see "General Discussion").

Testing Position: Supine patient flexes hip with abduction and lateral rotation and keeps the knee in extension.

Patient Fixation Requirements: The knee must be held in extension, whether the pressure is being applied above or below it. Generally the patient's weight is adequate for stabilizing the trunk. There should be no elevation of the lumbar spine from the examination table.

Stabilization: The pelvis must be kept from rotating around the vertical axis. The examiner stabilizes on the opposite anterior superior iliac spine, taking care to use a broad contact to avoid causing pain to the patient. It is very difficult — if not impossible — to accurately test this muscle if the examination table has soft cushions; the pelvis sinks into the softness on the side of the test, making adequate stabilization almost impossible.

Test: Force is directed against the anteromedial aspect of the leg in a direction of extension and slight abduction. The point of the examiner's contact on the leg depends on the amount of leverage required for the test. On most individuals, adequate leverage is achieved by contacting slightly proximal to the knee. On very strong individuals use a longer leverage, contacting at the ankle. The direction of pressure should be vectored between the activity of the rectus femoris and the adductors.

Body Language of Weakness:

Testing position: The patient will not be able to hold the testing position when the examiner lets go. To recruit more activity from the rectus femoris, the patient will adduct and medially rotate the leg. Knee flexing will also help the rectus femoris participate in this test to a greater extent. To recruit more activity of the adductors the patient will attempt to rotate the pelvis, lifting the side opposite the test away from the table.

During test: As the examiner applies pressure, the patient with a weak psoas will attempt to change the test by using more adductors, or using more hip flexion obtaining synergism from the rectus femoris.

Movement aberrations: Gait will be that of the "psoas flick," which is an external flicking of the foot on the swing phase of gait.

Postural imbalance: Bilateral psoas weakness allows loss of lumbar curve. In unilateral weakness, there will be a deviation of the lumbar spine away from the weakness, and a pelvic drop on that side. Medial leg rotation is probable on the side of weakness.

Alternate Testing Method: The patient may be tested in the standing position, leaning against an upright hi-lo table. Stabilization of the pelvis is more difficult in this position.

Nerve Supply: Lumbar plexus, L1, **2**, **3**, 4

16—58. Testing pressure applied over medial condyle of the tibia. This is adequate for most patients, and helps eliminate possibility of accidentally challenging a knee subluxation.

16—59. Greater leverage may be needed on very strong patients.

Psoas (continued)

Neurolymphatic:
Anterior: 1" above umbilicus and 1" from midline.
Posterior: T12-L1 between spinous and transverse processes.

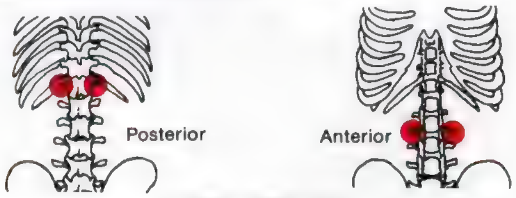
Neurovascular: 1 1/2" lateral to external occipital protuberance.

Reactive Muscle Correlation: Adductors, opposite anterior neck flexors, diaphragm.

Nutritional: Vitamins A and E, kidney concentrate or nucleoprotein extract

Meridian Association: Kidney

Organ-Gland Association: Kidney



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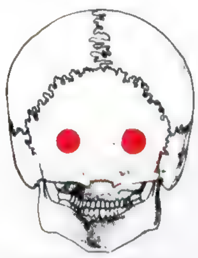
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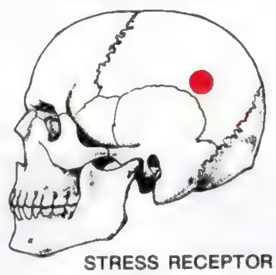

STRESS RECEPTOR

General Discussion: There has been much controversy over the rotational aspect of the psoas major and iliacus. Much of this controversy arises from the change of action as the limb moves from a neutral position to one of extension and flexion. Another factor in the controversy is that rotation of the thigh does not produce rotation of the femur about its long axis. The rotational axis of the femur is on a line from the head to the condyles of the femur; thus the insertion of the psoas is lateral to the rotational axis of the femur. Rotation about the long axis could only take place by displacing the head from the acetabulum. Electromyographic evidence indicates the psoas is a limited lateral hip rotator.[1, 11] Some have demonstrated activity of the iliopsoas in both internal and external rotation.[19] Regardless of the controversy, it seems reasonable to take the philosophical attitude of Basmajian[1] with the statement, "The controversy as to whether it is a medial or lateral rotator should be abandoned because, in fact, it is only a weak lateral rotator."

In applied kinesiology, a test has been used to determine the medial rotation of the thigh on the pelvis. Called the "leg turn-in test," it has been said to evaluate psoas hypertonicity. Clinical evidence seems to support that the psoas is a lateral thigh rotator, since therapeutic efforts to relax the psoas give additional medial rotation of the thigh. It must be remembered, however, when evaluating for internal thigh rotation that the psoas is limited in this activity. A major lateral thigh rotator is the piriformis, which should be considered whenever rotation of the thigh is being evaluated.

The bilateral psoas is important for its aspect known as the psoas shelf. When the psoas is either hypertonic or hypotonic, it changes the relationship of the psoas shelf. Clinically it seems to contribute to a recurrent ileocecal valve and valves of Houston involvement. (These conditions are discussed in Volume V of this series.)

The psoas gives support to the sacroiliac articulation; for this reason it can be very important in a sacroiliac fixation or subluxation. When the psoas is hypertonic, it contributes to a sacroiliac fixation by keeping the articulation in a tightened state. When the psoas is weak, there is lack of stabilization to — and consequent instability of — the sacroiliac articulation, allowing a subluxation to easily develop. Returning the psoas to normal function will help eliminate the recurrence of both the sacroiliac fixation and subluxation.

Bilateral weakness of the psoas indicates a functional fixation between the occiput and the atlas. Correcting the fixation at this area will immediately return the bilateral psoas weakness to strength.

The origination of the psoas from the transverse processes, lateral borders of the vertebrae and intervertebral discs is a prominent contributory factor in many low back problems. In any disc involvement, the psoas should be considered for its integrity and balance.

The psoas plays an important role in postural balance, and is active in the relaxed standing position.[1, 11, 26] Being a postural muscle, there is a predominance of red muscle fibers which fatigue more slowly.[5] The psoas has been found clinically involved on a frequent basis with Goodheart's repeated muscle testing technique (see page 230). The role of the psoas in rotation of the lumbar spine during flexion has been pointed out by Illi.[14] In most cases, a hypertonic psoas will cause hyperlordosis of the lumbar spine. Ng[26] presents a discussion of how a hypertonic psoas can sometimes cause a kyphotic sacral-lumbar spine.

The hip flexors can be tested for length by having the patient sit on the very edge of an examination table so that leaning back into a supine position causes the hip joint to be over the edge of the table. The knees and hips are flexed so the thighs touch the anterior trunk. This brings the lumbar spine and pelvis into flexion. The patient holds one thigh against the trunk while extending the opposite hip. While the lumbar spine and pelvic position is held, the opposite leg should be capable of going into slight extension. If the psoas, iliacus, and rectus femoris muscles are short, the thigh will be held in some flexion. Of course, when this test is being done there should be no restricting clothing to limit hip and pelvic range of motion.

16—60. Starting position for evaluating hip flexor length.

16—61. When pelvis is held in position by holding flexed hip and knee, the tested leg should go into slight hip extension.

16—62. In the presence of short hip flexors, the hip is limited from going into extension.

Iliacus

Origin: Upper 2/3 of the iliac fossa, internal border iliac crest; anterior sacroiliac, lumbosacral and iliolumbar ligaments; ala of sacrum.

Insertion: Lesser trochanter of the femur with psoas major.

16—63.

Action: With the psoas, flexes thigh; minimal activity on rotation of thigh.

Reversed Origin-Insertion and Change of Action: Flexes pelvis on thigh.

Testing Position: The supine patient flexes his hip with abduction and lateral rotation. The position requires more extreme flexion and abduction than the psoas test.

Patient Fixation Requirements: The knee is held in extension throughout the test, whether the examiner is directing his testing pressure distal or proximal to the knee.

Stabilization: The examiner stabilizes the pelvis to avoid rotation around the central axis. This is often a difficult stabilization to obtain and requires an examination table with solid cushions. Soft cushions allow the pelvis to sink into the table on the side of test, and the examiner cannot control pelvic stabilization.

Synergists: Psoas major, adductors, rectus femoris.

Test: The examiner makes contact at the anteromedial distal femur or at the ankle, depending on the amount of leverage required. The force is directed toward hip abduction and extension.

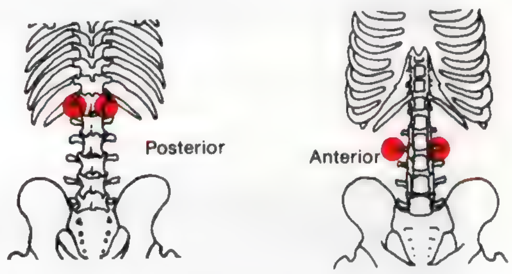
Body Language of Weakness:

Testing position: The patient with a weak iliacus will be unable to hold the testing position in which the examiner places him. The leg will often be pulled toward adduction so the rectus femoris can more efficiently hold the hip flexion.

During test: The examiner will feel increased adduction of the leg or hip flexion if the patient attempts to substitute the adductors or rectus femoris. When the rectus femoris is more active in the test, there will be a tendency for loss of external thigh rotation.

Movement aberrations: In the presence of bilateral weakness, the patient will have difficulty flexing at the hips, especially when arising from a supine position. If weakness is unilateral, the patient will rotate the trunk to the side of weakness when arising from a supine position.

Postural imbalances: The iliacus gives anterior stabilization to the pelvis. Weakness will cause a posterior rotation of the ilium.



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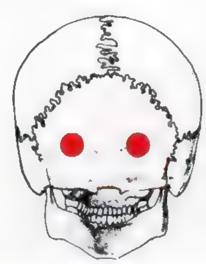

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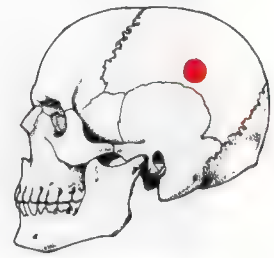


STRESS RECEPTOR

Nerve Supply: Femoral nerve, **L1, 2, 3**

Neurolymphatic:
- **Anterior:** 1" above umbilicus and 1" from midline.
- **Posterior:** T12-L1 between spinous and transverse processes.

Neurovascular: 1 1/2" lateral to external occipital protuberance.

Nutritional: Vitamins A and E, kidney concentrate or nucleoprotein extract

Meridian Association: Kidney

Organ-Gland Association: Kidney

General Discussion: The iliacus is often considered along with the psoas as the iliopsoas; its action on the thigh is considered to be the same as that of the psoas. Electromyographic studies show it to be generally active at the same time as the psoas. Basmajian[1] demonstrated electrical activity on lateral rotation and occasionally on medial rotation. If it is to be considered as a thigh rotator at all, it is a weak one. Along with the psoas, the iliacus is active as a postural or stabilizing muscle of the joint.[1]

When evaluating the kidney by muscle-organ/gland association in applied kinesiology, it is necessary to consider the iliacus. The test described for this muscle will sometimes show weakness when the psoas test does not. Some corrective procedures needed for kidney function may be overlooked if the iliacus is not tested.

16—64. The iliacus test is the same as the psoas test, but the starting position is with more hip flexion and abduction.

ABDOMINAL MUSCLES

The abdominal muscles are very important in providing spinal stabilization and influencing pelvic balance. They are also important in spinal curvatures and organ support.

The abdominal muscles have received much attention from researchers using electromyography to determine the type of exercise most effective for strengthening them. In applied kinesiology's clinical experience, it has been observed that the benefits of exercise will be limited if there is some factor — such as the neurolymphatic reflex, neurovascular reflex, etc. — which is active, causing the muscles to test weak on manual muscle testing. After correcting various factors influencing strength on manual muscle testing, exercise procedures are much more effective. This group of muscles is one of the few areas of the body where exercise following applied kinesiology corrections is often of value. Findings from electromyographic studies indicating the best types of exercises will be presented at the end of the applied kinesiology material on the muscles.

The original methods of testing the abdominal muscles described in applied kinesiology were general. The rectus abdominis and general abdominal muscles are tested with the patient seated, knees extended and trunk leaning back. The examiner stabilizes the thighs to the table, and directs force to the anterior thorax. The oblique muscles are tested in a general manner by having the patient rotate the trunk on the pelvis; the examiner applies testing pressure at the anterior thorax or on the shoulder. When the patient is rotated to the right, the left external and the right internal obliques are being tested. This method is still used for general muscle testing.

Various divisions of the rectus abdominis and oblique muscles appear to act independently in different movements and support of the structure. The first description of the independent action of sections of the abdominal muscles was by Goodheart[10] after he observed that the various sections of the rectus abdominis — divided by inscriptions — can be reactive with one another. The upper portion of the rectus abdominis appears to be reactive with the lower portion; this can be observed on manual muscle testing.

Methods for evaluating the various sections of the abdominal muscles have been described by Beardall[2,3] and will be mentioned here. The ability to differentiate muscular dysfunction of the various sections is important when there is poor pelvic support, and in curvatures such as idiopathic scoliosis. Beardall's testing methods appear to be clinically sound. Electromyographic evidence of the divisions' action in these tests has not been demonstrated.

Beardall also presents additional reflex points, cranial association, foot involvement, and nutrition, as well as organ association, for the various divisions of these muscles. These are discussed in his text, but they have not yet been put into practical application by this author.

Rectus Abdominis

When individual sections of the rectus abdominis are weak as a result of faulty proprioceptive function, muscle stretch reaction, or other local muscle involvements, there will be positive therapy localization of that section. When learning to test the individual sections of the rectus abdominis as described by Beardall, it is valuable to compare direct therapy localization findings with the sections of the muscle and the individual tests. Some of these tests vary only slightly; thus the examiner must use great specificity in applying the muscle test.

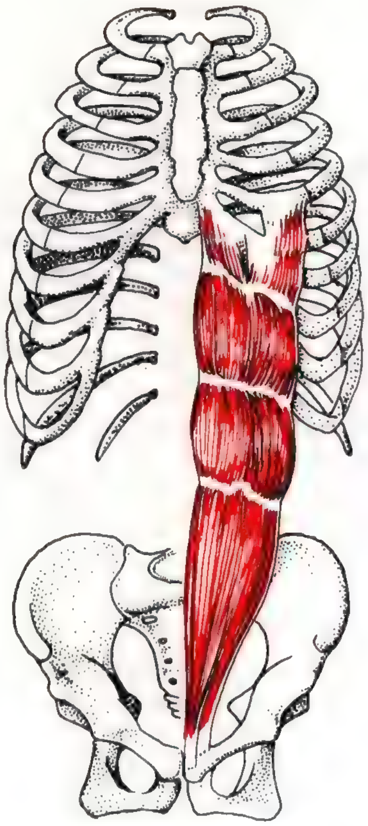
There are several common factors in these tests which will be discussed prior to the description for the individual muscle tests.

Origin: From the crest of the pubis and the symphysis pubis.

Insertion: Into the costal cartilage of the 5th, 6th, and 7th ribs, and the side of the xiphoid process.

Action: In standing position, supports organs anteriorly. By way of supporting organs, holding rib cage and pubis together, gives anterior support to the lumbar spine. With aid of gluteus maximus and hamstrings, keeps pelvis from going into anterior tilt.

Variations of Action: The rectus abdominis is separated at three levels by inscriptions. The superior and inferior muscle masses, as well as those between inscriptions, receive nerve supply from different levels. It appears that the sections of muscles act independently. Independent action of sections of muscle has been described by Markee et al.[22] with specific reference to muscles of the thigh, which



16—65. *Rectus abdominis*

cross the hip and knee. Clinical observation in applied kinesiology supports the hypothesis that various levels of the rectus abdominis and sections of the oblique muscles act independently, and possibly influence each other through the different afferent nerve supplies. This has not been demonstrated electromyographically. It would be a valuable area to study because of the clinically observed effect these sections of muscles have on pelvic balance and indirect spinal stabilization.

Testing Position: The testing position requires that the patient have his arms crossed on his chest. Care must be taken to avoid accidental therapy localization of an active area, such as a neurolymphatic reflex. This can usually be accomplished by having the patient's fingers flexed into a fist and kept away from areas known to be frequently active. If there is any doubt about this, the patient's hands should be kept completely away from his body and the testing procedure repeated.

Patient Fixation Requirements: All of the seated abdominal muscle tests require fixation of the patient's hips by strong hip flexors.

Stabilization: The examiner must stabilize the thigh(s) against the table.

16—66. General test for rectus abdominis. Examiner should observe for separation of anterior thoracic cage from the symphysis pubis.

Abdominal Muscles (continued)

Synergists: The internal and external oblique abdominals are synergistic in all rectus abdominis tests.

Test: During the testing procedure, the examiner should make certain that the patient's hips are fixed by adequate muscular activity. The abdominal muscles may have good integrity but appear weak because of weak hip flexors. If the patient cannot stabilize his pelvis on his thighs, the abdominals cannot be tested until the hip flexors have been strengthened.

The tests also require that the examiner observe for separation of the anterior thoracic cage from the symphysis pubis. The patient may appear strong when in fact there is considerable separation of the thorax and pubis. The gross position may be maintained by strong activity of the psoas holding the lumbar spine in position. If the abdominals are weak, there will be separation of the anterior thorax from the symphysis pubis.

Body Language of Weakness:

Testing position: The patient cannot hold the testing position, or he will tend to change the position to recruit more activity from either the obliques or other sections of the rectus abdominis.

During test: The patient will make similar changes in the testing parameters, such as those which may be made when going into the testing position or attempting to hold it.

Movement aberrations: The patient, when weak, will turn his body to recruit other muscles as he arises from the supine position. If the abdominal muscles are very weak, the patient will usually turn to the side and pivot up from the supine position, using his arms to aid the activity.

Some individuals who have studied how to use body energies conservatively will show body language of abdominal weakness in their movement patterns when there is none. Some procedures, such as those taught by Feldenkrais,[6] teach an individual to roll to the side as he arises from the supine position. Some people will use these conservative methods although they have not studied the procedures. This is done with an unconscious effort for conservation.

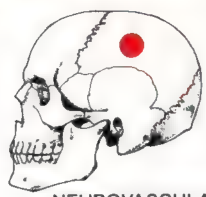
Postural imbalances: Separation of the thoracic cage and the anterior pelvis with poor support of the viscera. Increased lumbar lordosis.

Nerve Supply: Ventral rami of T5-12, iliohypogastric, and ilioinguinal.

Neurolymphatic:

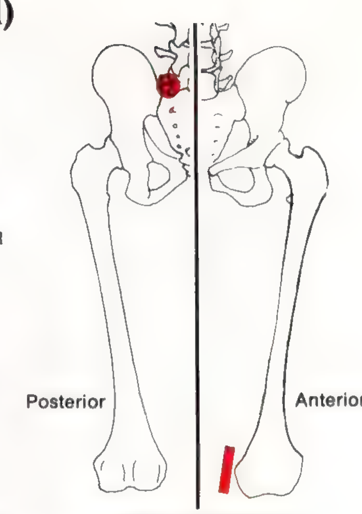
Anterior: Upper 1/3 of anteromedial thigh.

Posterior: Between PSIS and L5 spinous process.



NEUROVASCULAR

STRESS RECEPTOR



NEUROLYMPHATIC BILATERAL

Neurovascular: Bilateral on parietal eminence 2" posterior to frontoparietal suture.

Reactive Muscle Correlation: Quadriceps and opposite gluteus medius, and from one division to another of the rectus abdominis.

Nutritional: Vitamin E, duodenal nucleoprotein extract or concentrate.

Meridian Association: Small intestine

Organ Association: Small intestine

General Discussion: The rectus abdominis is a very important muscle in low back conditions. Many times a spinal problem is due to failure of anterior support to the pelvis, causing a lumbar lordosis with possible facet jamming or an imbrication-type subluxation.

The abdominal muscles will generally be extremely involved when there are chronic problems in the small intestine, such as with Crohn's disease. These conditions are usually associated with a very involved neurolymphatic reflex, which must be treated thoroughly. Nutritional support, dietary change, and the other factors must be cleared or the positive neurolymphatic reflex will return, even though it was cleared successfully. These conditions may require a generalized therapeutic effort toward the lymphatic system, such as retrograde lymphatic technique. Increasing the patient's intake of water may be necessary to gain improved lymphatic function.

General abdominal muscle weakness is often associated with cranial faults, particularly the sagittal suture fault. Therapy localization and challenge can be used for differential diagnosis of this involvement. If cranial correction is required, other treatments directed toward the abdominals will probably not hold (see Volume II).

RECTUS ABDOMINIS
First Division (Inferior)

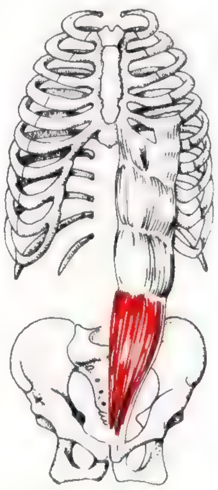
Origin: Symphysis pubis and crest of pubis

Insertion: Into the tendinous intersection to join with the second division of the rectus abdominis

Testing Position: Patient seated with his knees extended and trunk flexed to 90°, with 23° rotation away from the side of test. Forearms crossed on chest, lumbars flexed (straighten lumbar lordosis).

Stabilization: Ipsilateral thigh is stabilized against table by examiner.

Test: Pressure is directed toward the middle of the ipsilateral clavicle in a direction to extend the trunk through the sagittal plane.



16—67.

16—68. Flexed 90°, rotated 23°.

RECTUS ABDOMINIS
Second Division (Inferior Middle)

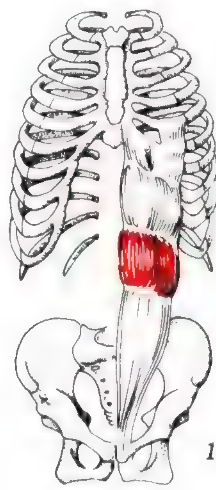
Origin: From the tendinous intersection between the first and second divisions.

Insertion: Into the tendinous intersection between the second and third divisions to join with the third division.

Testing Position: Seated patient with knees extended flexes trunk to 90°, with 23° rotation away from the side of test. Forearms crossed on chest and lumbars extended (increase lumbar lordosis).

Stabilization: Examiner stabilizes ipsilateral thigh on table surface.

Test: Examiner directs pressure against the middle ipsilateral clavicle to extend the trunk in the sagittal plane. The lumbar extension directs activity to the second division.



16—69.

16—70. Flexed 90°, rotated 23°.

RECTUS ABDOMINIS
Third Division (Superior Middle)

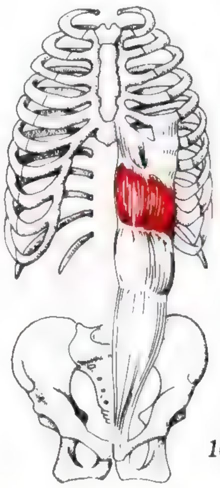
Origin: From the tendinous intersection between the second and third divisions of the rectus abdominis.

Insertion: Into the tendinous intersection between the third and fourth divisions of the rectus abdominis to join with the fourth division.

Testing Position: Seated position with the knees extended and the trunk flexed to 70°, with a 23° rotation away from side of test. Forearms crossed on chest.

Stabilization: Both thighs are stabilized against the table surface.

Test: Examiner directs pressure against ipsilateral mid-clavicular area to extend trunk through sagittal plane.



16—71.

16—72. Flexed 70°, rotated 23°.

RECTUS ABDOMINIS
Fourth Division (medial portion of superior)

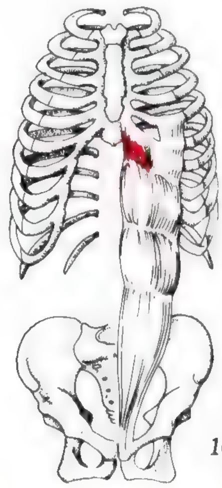
Origin: Medial half of the tendinous intersection between the third and fourth divisions.

Insertion: Costal cartilage of the 5th rib and the lateral aspect of the xiphoid process

Testing Position: Seated patient with knees extended flexes trunk 45°, with 23° rotation facing away from the side of test. Forearms crossed on chest.

Stabilization: Both thighs stabilized against table surface.

Test: Pressure is directed to the ipsilateral mid-clavicular area to extend the trunk through the sagittal plane.



16—73.

16—74. Flexed 45°, rotated 23°.

RECTUS ABDOMINIS
Fourth Division (lateral portion of superior)

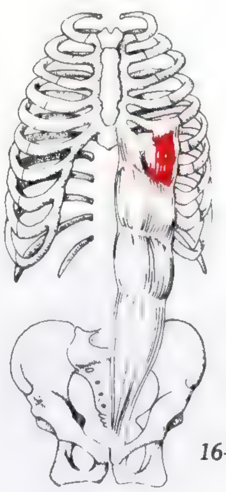
Origin: Lateral half of the tendinous intersection between the third and fourth divisions.

Insertion: Costal cartilage of the 6th and 7th ribs

Testing Position: Seated patient with knees extended flexes trunk 45°, with 45° rotation away from the test. Forearms are crossed on the chest.

Stabilization: Both thighs are stabilized against table surface.

Test: Pressure is directed to the ipsilateral midclavicular area to extend trunk through the sagittal plane.



16—75.

16—76. Flexed 45°, rotated 45°.

Transverse Abdominal

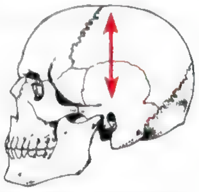
Origin: Lateral 1/3 of the inguinal ligament, anterior 3/4 of the internal edge of the iliac crest, lumbodorsal fascia, and from the inner edges of the lower six costal cartilages.

Insertion: Into the linea alba aponeurosis which passes behind the rectus abdominis.

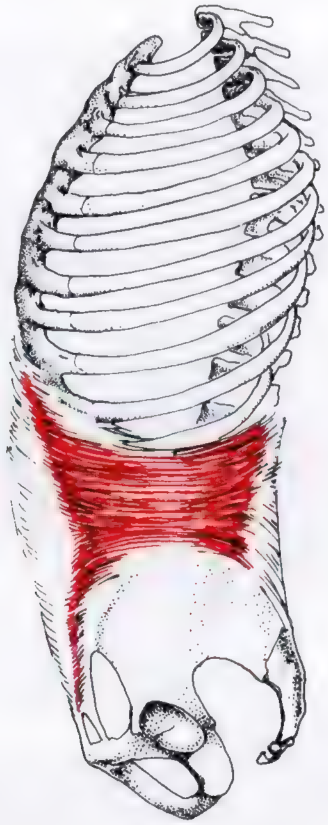
Action: Constricts abdominal contents; assists in forced expiration; stabilizes the linea alba.

Test: There is no direct muscle test for the transverse abdominal. Weakness can best be detected by observing the patient as he arises from a supine position. In the presence of a weak transverse abdominal, there will be bulging of the lateral abdomen.

Nerve Supply: Branches of the 7th-12th intercostal and the ilio-hypogastric and ilioinguinal nerves.



STRESS RECEPTOR



16—77.

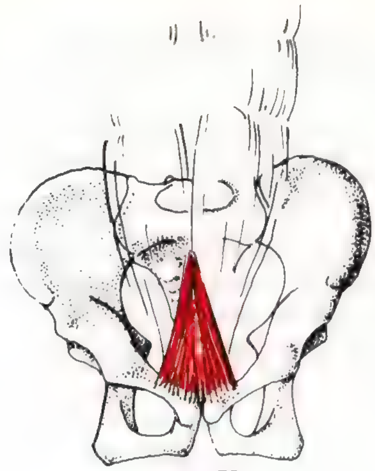
Pyramidalis

Origin: Anterior aspect of the pubis and symphysis pubis ligament.

Insertion: Linea alba, midway between the umbilicus and pubis.

Action: Compresses the abdomen, supports abdominal viscera, tenses the linea alba, and is active in forced expiration.

Testing Position: In the sitting position, the patient flexes his trunk 110°, with approximately 23° rotation away from the side of test. Patient crosses his forearms across his chest, taking care not to accidentally therapy localize with his hands.



16—78.

Patient Fixation Requirements: Adequate muscular action is necessary to fix the pelvis on the legs, giving a solid base from which the pyramidalis can function.

Stabilization: The examiner stabilizes the thigh against the table on the side of test.

Synergists: Rectus abdominis, external oblique abdominal, and internal oblique abdominal.

Test: Pressure against the upper chest at the midclavicular area. Pressure is directed through the sagittal plane to extend the trunk on the pelvis. The examiner should carefully observe that the pelvis is fixed with the thighs. Poor fixation can cause the patient to be unable to hold the testing position, but not because of a weak pyramidalis.

Body Language of Weakness:

During test: Patient will attempt to de-rotate the trunk in order to recruit more synergistic action of the rectus abdominis.

Nerve Supply: Subcostal T12

16—79. Trunk flexed 110°, rotated 23°.

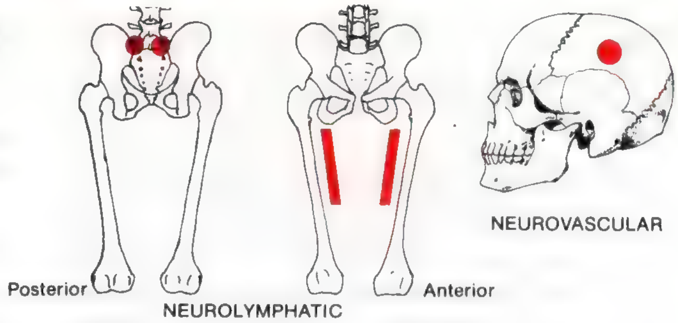
Oblique Abdominal Muscles — General

Testing Position: Seated patient with legs extended on table surface. Trunk is in approximately 60° flexion and rotated.

Patient Fixation Requirements: Patient's pelvis must be fixed to the thighs by adequate muscle function.

Stabilization: Examiner stabilizes thighs against the table.

Test: Testing pressure with the examiner's hand and forearm is directed to the middle upper thorax and the patient's shoulders; force is directed to extend the trunk. This is a rather gross test of oblique muscle function. When the patient is rotated to the right, the left external and right internal obliques are being tested. The examiner should observe for separation of the thorax from the symphysis pubis. The patient's failure to maintain the position could be caused by poor pelvic stabilization on the thighs, giving false indication of abdominal muscle weakness.



Neurolymphatic:
- **Anterior:** upper 1/3 of anteromedial thigh
- **Posterior:** Between PSIS and L5 spinous process

Neurovascular: Bilateral on parietal eminence, 2" posterior to frontal parietal suture.

Nutritional: Vitamin E, duodenal concentrate or nucleoprotein extract.

Meridian Association: Small intestine

Organ Association: Small intestine

16—80. General test for oblique abdominal muscles.

EXTERNAL OBLIQUE ABDOMINAL — ANTERIOR DIVISION

Origin: External inferior surfaces of the 5th-8th ribs.

Insertion: Linea alba by means of a broad abdominal aponeurosis.

Action: Acting unilaterally, rotates the trunk anteriorly and flexes it laterally on the side of muscle contraction. If rotation only is the activity, the opposite internal oblique is synergistic. Acting bilaterally, flexes the trunk, approximating the anterior thorax with the pubis. Supports and compresses the abdominal viscera, giving anterior support to the spinal column. Gives anterior stabilization to pelvis.

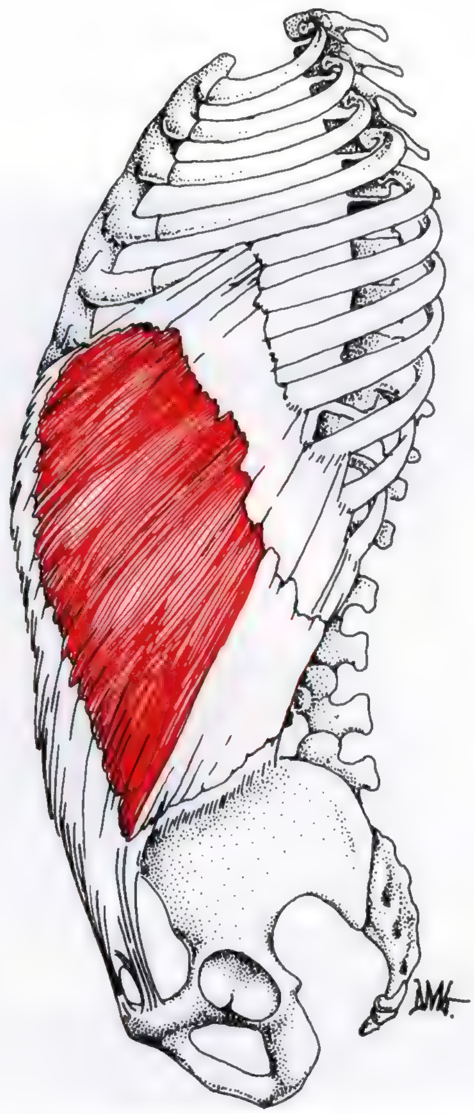
Testing Position: Seated patient with knees extended flexes trunk to 90° and rotates shoulder girdle 45° toward opposite knee.

Patient Fixation Requirements: The pelvis must be fixed to the thigh by the patient's adequate muscular activity.

Stabilization: The examiner stabilizes the thigh on the side of test against the table.

Synergists: Rectus abdominis, internal oblique abdominals of opposite side, psoas on lumbar spine in total trunk flexion.

Test: Pressure is against the shoulder in a direction to de-rotate and extend the trunk simultaneously. The testing activity is that of separating the thoracic cage from the pelvis. The examiner's observation should be that of the separation and de-rotation, not that of pushing the patient down. Weak hip flexors



16—81.

can cause failure of hip fixation. A strong psoas can stabilize the trunk in an upright position, yet there may be significant separation of the anterior thorax from the pelvis.

Body Language of Weakness:

Testing position: Patient attempts to come out of the rotational position to recruit synergistic activity of the rectus abdominis.

During test: There is continued effort to change trunk position to recruit synergistic muscles.

Movement aberrations: When one or all of the abdominal muscles are weak, the patient tends to roll to the side when getting up from the supine position.

Postural imbalance: Anterior rotation of the pelvis with an increased lumbar lordosis. Pendulous abdominal area. Trunk rotation posterior on side of weakness.

Nerve Supply (to anterior and lateral divisions): Branches of the 8th-12th intercostal and iliohypogastric and ilioinguinal nerves.

General Discussion: The anterior fibers of the external oblique, inserting into the broad abdominal aponeurosis and ultimately the linea alba, are important in supporting the abdominal viscera. They also give anterior support to the pelvis, and should be suspected of weakness when there is an anterior tilt of the pelvis or a pendulous abdomen.

16—82. Trunk flexed 90°, shoulder girdle rotated 45°.

EXTERNAL OBLIQUE ABDOMINAL — LATERAL DIVISION

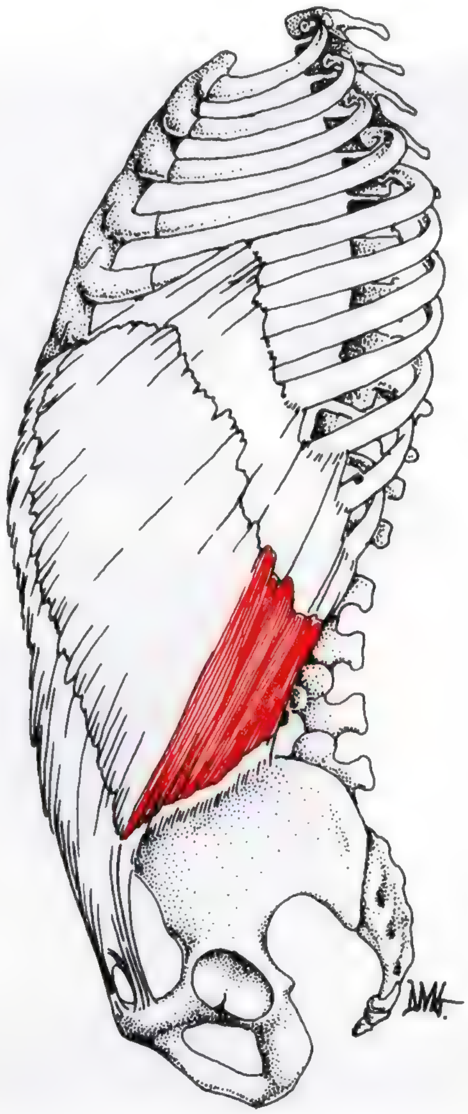
Origin: Lateral inferior surfaces of the 9th-12th ribs.

Insertion: Into the anterior half of the iliac crest along the outer lip.

Action: Unilaterally, with the lateral fibers of the internal oblique on the same side, laterally flexes the vertebral column, approximating the thorax and the iliac crest laterally. Acting bilaterally, flexes the trunk, primarily acting on the lumbar spine. If the origin is fixed, the action is to elevate the anterior aspect of the pelvis, thus giving it anterior stabilization.

Testing Position: The supine patient laterally flexes the pelvis on the trunk, approximating the iliac crest with the lateral thoracic cage to displace the legs approximately 10° off center line with the table. While the thighs continue to be fixed with the pelvis, the pelvis is flexed approximately 10°, which lifts the feet approximately 4" from the table surface. The posterior rotation of the pelvis aligns the lateral fibers of the external oblique abdominal muscle. The examiner can best place the patient in the testing position by observing the origin and insertion of the muscle fibers and aligning them to be horizontal with the table surface, always keeping the hips flexed and the pelvic motion taking place from lumbar spine motion.

Patient Fixation Requirements: The patient must have strong hip abductors on the side of test and adductors contralateral to the test to fix the legs with the pelvis. There must also be adequate muscle activity to fix the pelvis with the thighs anteriorly and posteriorly.



16—83.

Stabilization: The patient's body weight somewhat stabilizes the trunk to the table; however, it is usually necessary for the patient to hold the table. The examiner stabilizes on the contralateral greater trochanter.

Synergists: Quadratus lumborum, posterior fibers of the internal oblique abdominals.

Test: The examiner places his arm under the ankles to support the legs in the testing position and contacts the lateral ankle, directing pressure to bring the legs to the center line of the table. The legs are used as a lever to impart lateral flexion to the pelvis in an effort to separate the anterior iliac crest from the thoracic cage. The examiner must observe for this separation. Failure to hold the legs in the testing position is not adequate observation for a weak lateral division of the external oblique abdominal muscle.

Body Language of Weakness:

Testing position: When the lateral division is weak, the patient will have a difficult time bringing the anterior crest of the ilium into approximation with the lateral thoracic cage. The patient will attempt to obtain approximation such as the testing position of the quadratus lumborum, recruiting its synergistic activity. To recruit the synergistic activity of the lateral division of the internal oblique abdominal, the patient will try to anteriorly rotate the pelvis, bringing these fibers into better alignment. This is seldom done.

During test: The same changes of pelvic alignment that are observed when the patient attempts to go into the testing position will be tried.

Postural imbalances: Anterior and external rotation of the crest of the ilium; lumbar lordosis.

Nerve Supply (to anterior and lateral divisions): Branches of the 8th-12th intercostal and the iliohypogastric and ilioinguinal nerves.

General Discussion: The lateral division of the external oblique abdominal muscle gives pelvic support to prevent lateral flaring of the ilium. Weakness of this muscle may contribute to a sacroiliac subluxation that has a medial component of the posterior superior iliac spine.

Because of the insertion of the muscle on the anterior half of the iliac crest, its weakness may contribute to an anterior tilt of the pelvis or a posterior ischium sacroiliac subluxation.

The integrity of this muscle division is important in category I pelvic involvements.

16—84. Legs 10° off center; lift legs approximately 4" from table.

INTERNAL OBLIQUE ABDOMINAL — ANTERIOR DIVISION

Origin: Lateral 2/3 of the inguinal ligament, and from the anterior 1/3 of the middle lip of the iliac crest.

Insertion: Crest of the pubis and linea alba by aponeurosis.

Action: Acting unilaterally, rotates the trunk, bringing the opposite shoulder forward and laterally flexing the trunk toward the side of muscle contraction. Action is in conjunction with anterior fibers of the external oblique on the opposite side. Acting bilaterally, flexes the vertebral column, approximating the anterior thorax and pelvis.

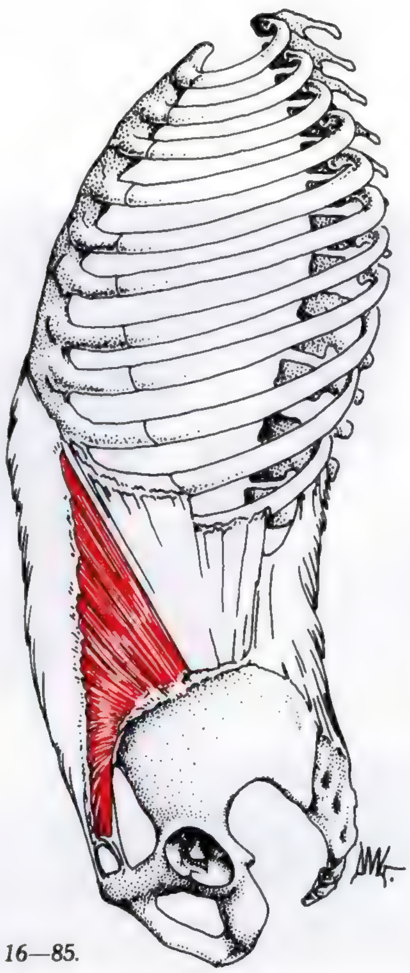
Testing Position: Patient is seated with knees extended and trunk flexed to 90°, with 45° rotation facing toward the side of test. Forearms are crossed on chest, taking care not to accidentally therapy localize a possibly positive area.

Patient Fixation Requirements: Adequate muscular action to fix the pelvis to the thighs is necessary.

Stabilization: The examiner stabilizes the thigh and pelvis against the table on the side of test.

Synergists: Opposite external oblique, anterior division; rectus abdominis. The psoas is active in this test to stabilize the lumbar spine to the pelvis. This, however, is not the test being observed; the test is that of separation of the thoracic cage from the pelvis.

Test: Pressure is directed to the upper anterior thorax in a direction to extend and laterally flex the trunk on the pelvis 45° away from the side being tested. The examiner should observe that the pelvis is fixed solidly on the table, and the patient is not being rotated on the table. In the presence of apparent weakness, he must also observe that the weakness is separation of the thoracic cage from the pelvis and not a failure of hip fixation.



16—85.

Body Language of Weakness:

Testing position: It is difficult for the patient to hold the testing position. There is a tendency not to rotate the trunk so that more synergistic action of the rectus abdominis can be obtained.

During test: The patient will attempt to change the parameters of the test by de-rotating, thrusting the anterior shoulder forward, or by trying to raise the thighs from the table.

Postural imbalances: When bilaterally weak, there is separation of the thoracic cage and pelvis, giving an anterior position to the pelvis with increased lumbar lordosis. When weak unilaterally, there is rotation of the trunk on the pelvis. When the internal oblique is weak, the ipsilateral shoulder rotates anteriorly.

Nerve Supply (for anterior and lateral fibers): T7-12, iliohypogastric and ilioinguinal ventral rami.

General Discussion: Weakness of this division allows external rotation of the iliac crest, which may contribute to an internal position of the posterior superior iliac spine in a category II sacroiliac subluxation. The integrity of this muscle division is also important in a category I pelvic fault.

Floyd and Silver,[8] using surface electromyography, demonstrated that the internal oblique abdominal muscle is constantly active in the relaxed standing position. They suggested that these fibers are continually on guard to protect the inguinal region from hernia. There is an increase of activity when intra-abdominal pressure is increased.

16—86. Trunk flexed 90°, shoulder girdle rotated 45°.

INTERNAL OBLIQUE ABDOMINAL — LATERAL DIVISION

Origin: Middle 1/3 of the iliac crest on the middle line and lumbar fascia.

Insertion: Inferior borders of the 10th, 11th, and 12th ribs.

Action: Acting unilaterally, approximates thorax and pelvis laterally. Contributes to rotation of the trunk on the fixed pelvis toward the side of contraction. Acting bilaterally, flexes the trunk on the pelvis.

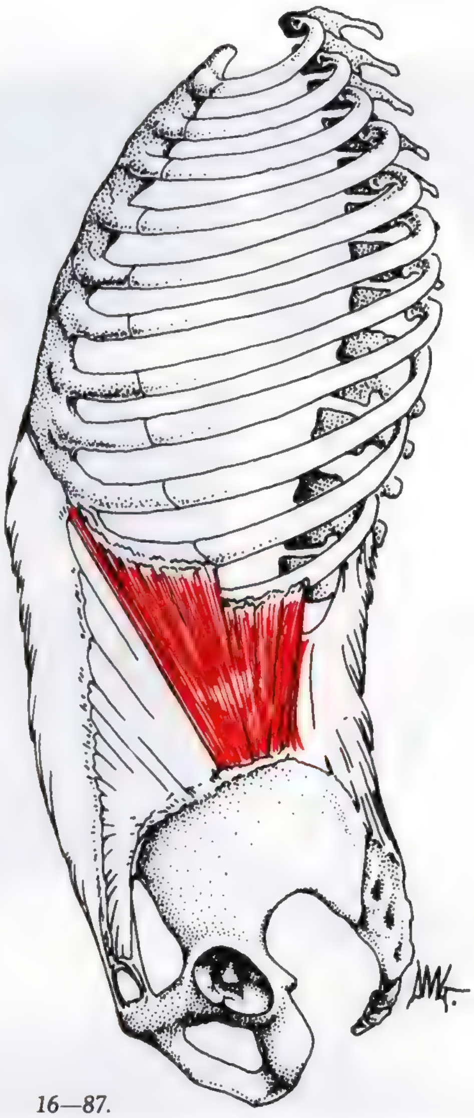
Testing Position: The seated patient extends knees and flexes trunk 100°, with 45° rotation facing away from the side of test. Forearms are crossed on chest, taking care not to accidentally therapy localize an active area. Laterally bend trunk toward ipsilateral knee, approximating the thoracic cage and pelvis.

Patient Fixation Requirement: Adequate fixation of the thighs with the pelvis.

Stabilization: Examiner stabilizes ipsilateral proximal thigh against the table, which also stabilizes the pelvis on the table.

Synergists: Internal oblique (anterior division), contralateral external oblique (anterior division), rectus abdominis.

Test: Pressure is directed against shoulder on side of test to extend and flex trunk in an effort to separate the lateral thoracic cage from the crest of the ilium.



16—87.

The examiner can observe the best direction of pressure by visually aligning the origin and insertion of these muscle fibers and directing pressure accordingly. He must make certain that there is adequate hip flexion, and that the pelvis is stabilized so the patient does not rock on the table. A soft examination table makes pelvic stabilization almost impossible.

Body Language of Weakness:

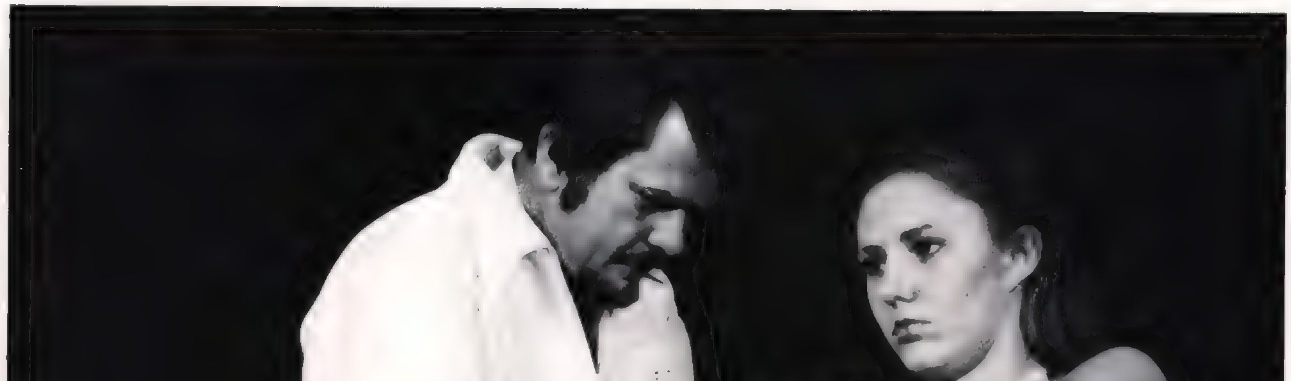
Testing position: Difficulty in maintaining the testing position without changing trunk position to recruit synergistic muscles.

During test: The change of position is better observed during the test, where the patient will try to decrease trunk rotation to recruit more synergistic activity of the rectus abdominis.

Postural imblance: Trunk will rotate on pelvis away from the side of weakness. Bilateral weakness causes increased anterior pelvic rotation and lumbar lordosis, along with poor lateral visceral support.

Nerve Supply (to anterior and lateral fibers): T7-12, iliohypogastric and ilioinguinal ventral rami.

General Discussion: This is an important support muscle to the pelvis when there is either a category I or II pelvic involvement. Weakness allows external iliac rotation, correlating with an internal posterior superior iliac spine subluxation of the sacroiliac.



16—88. Trunk flexed 100°, shoulder girdle rotated 45°.

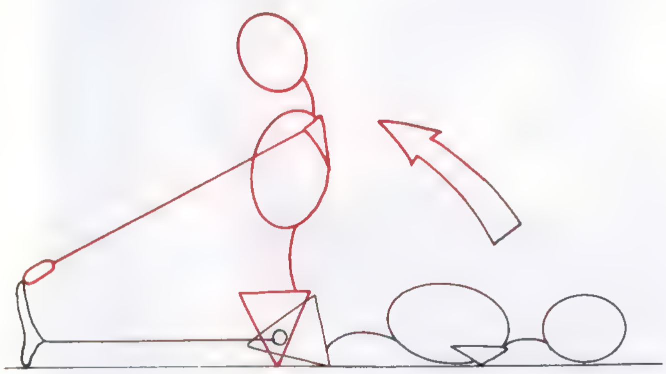
Abdominal Exercise

Of all the muscles evaluated and treated in applied kinesiology, the abdominals are the ones most often needing exercise rehabilitation. As previously mentioned, clinical experience in AK reveals that muscles do not respond well to exercise if there is interference with the energy pattern as revealed by manual muscle testing and general applied kinesiology testing procedures. The first priority, then, is to return the muscles to normal, and then proceed with exercises.

There are several types of exercise described in the literature for the abdominal muscles. Electromyography has been used to help determine the optimum exercise procedures. Of the many abdominal exercises which have been developed, the six most common — and apparently effective — types will be discussed here. These are described as the long-lying sit-up and crossed long-lying sit-up, with and without support to the feet; hook-lying and crossed hook-lying, with and without support to the feet; shoulder lift; and sit-backs.

The desired effect from the exercise and the patient's condition should be considered before prescribing an exercise for the individual. A consideration which should be made prior to determining the type of abdominal exercise is the length of the hip flexors. This is important because many times abdominal exercises are necessary to help control an excessive lumbar lordosis and possible facet jamming. If the hip flexors are short (and possibly excessively strong), they will probably cause an increased anterior tilt of the pelvis, adding to the lumbar curve. Some abdominal exercises are more effective in strengthening the iliopsoas than others. (Evaluating the length of the hip flexors was discussed with the psoas muscle earlier in this chapter. See page 302.)

Using fine wire electromyography, LaBan et al.[19] demonstrated that the iliopsoas begins activity during long-lying sit-up exercise only after the first 30° of hip flexion have taken place. In the hook-lying position, the iliopsoas was active throughout the exercise. Greenlaw,[11] also using fine wire electrodes but individually to the iliacus and the psoas, demonstrated maximal activity throughout the full range when sitting up from the supine position with the knees in



16—89. Long-lying sit-up. With or without foot stabilization the patient comes from the supine position to touch his fingers to his toes.

16—90. Crossed long-lying sit-up. With or without foot stabilization, the patient comes from supine position to touch his fingers to contralateral toes.

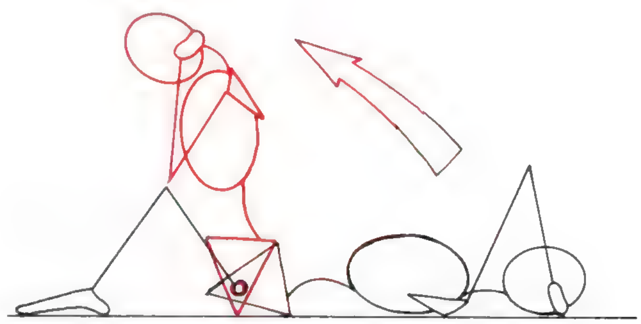
neutral extension. The disagreement in these studies may be due to the various ways of doing the exercises. In any event, when there is marked lumbar lordosis, strong exercise to the iliopsoas should be avoided.

In a book for the lay public entitled *Total Fitness*, Morehouse[25] recommends sit-back exercise to concentrate activity to the abdominal muscles. He states the procedure was developed from electromyographic studies, but does not indicate whether the iliopsoas was studied. Using surface electrodes, Flint and Gudgell[7] demonstrated that the backward lean exercise, which is apparently similar to Morehouse's, primarily activates the lower rectus abdominis.

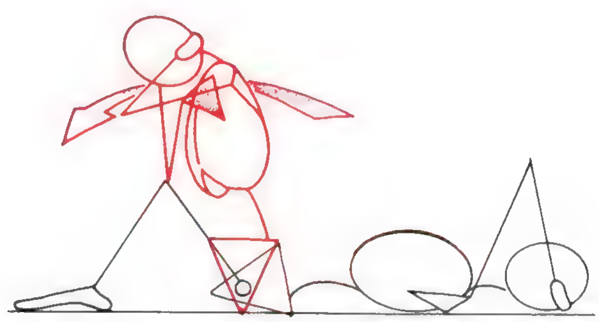
Flint goes on to indicate that the lower rectus abdominis is activated more when the feet are supported in either the long-lying or hook-lying sit-up. The upper rectus is more active when the feet are not supported in these exercises. It can be observed that poor anterior abdominal support is frequently greater in the upper or lower abdominal section, indicating weakness of the upper or lower rectus abdominis. Goodheart[10] observed this to be involved with one portion of the rectus abdominis being reactive to another (see "Reactive Muscles"). He described this as the individual having an upper or lower "pot."

Flint and Gudgell[7] used surface electromyography to study abdominal muscle activity in seventeen types of abdominal exercises. They found that the greatest activity in the abdominal muscles was from the supine position, up to 45°, and back down. From 45°—90°, there was a significant decrease in activity. There was more activity during the concentric muscle action than the eccentric, which seems to disagree with Morehouse's sit-back exercise. The exercise favored by Flint and Gudgell was the trunk curl, with knees flexed 45° with and without body twist, and with or without support to the feet. This exercise is a combination of the shoulder lift sit-up and hook-lying position.

An important point is made by Halpern and Bleck[12] regarding the extraordinary increase in intervertebral disc pressure during a forced sit-up action. Repeated



16—91. Hook-lying sit-up. Starting position: trunk in supine position, with hips and knees flexed. With or without foot stabilization, the patient raises his trunk to touch elbows to knees.



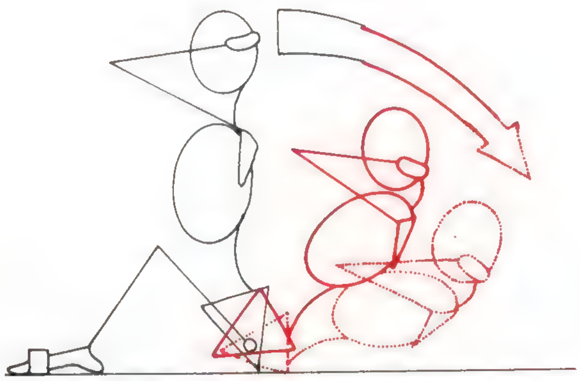
16—92. Crossed hook-lying sit-up. Starting position: trunk in supine position, with hips and knees flexed. With or without foot stabilization, the trunk is raised to touch elbow to contralateral knee.

Abdominal Exercise (continued)

sit-up activity may be harmful to the intervertebral disc, especially if the anulus fibrosus has poor integrity. To counteract the possible harmful effects of sit-ups on the intervertebral disc, Halpern and Bleck developed the shoulder lift/hook-lying sit-up. Activity in this exercise requires only that the scapula be lifted from the table. This position changes the angle between L1 and L5 by only 3°, thus placing less stress into the intervertebral disc. Using surface electrodes, they electromyographically demonstrated significant activity of the rectus abdominis and external oblique during this exercise (see 16—94).

The two major complications of abdominal exercise are the possibility of shortening or excessively strengthening the iliopsoas, and possible damage to disc structure. It appears that the shoulder lift/hook-lying sit-up is an exercise of choice to prevent these possibilities. The exercise gives strong activity to the abdominal musculature as indicated electromyographically. Some studies have indicated minimal or no activity of the iliopsoas in the first 30° of sit-up activity. In any event, there is less iliopsoas activity when the hips are not taken through a full range of flexion. In the shoulder lift exercise, it is only necessary for the iliopsoas and rectus femoris to stabilize the pelvis, giving a solid base from which the abdominal muscles can pull. The decreased lumbar flexion in this exercise gives less pressure to the intervertebral disc. Many individuals who require this exercise have poor integrity of the lumbar spine, including the intervertebral disc.

Consideration of the mechanics of the lumbar spine, abdominal muscles, and hip flexors is necessary to determine the best rehabilitation procedure for the individual patient. Frequently when there is need to strengthen the abdominal muscles, there will be hypertonicity of the spinal extensor muscles. The usual applied kinesiology approaches for hypertonic muscles should be applied before exercise procedures are begun. When there is good integrity of the intervertebral disc and no shortening of the iliopsoas muscle or anterior pelvic tilt, more vigorous abdominal exercises can be undertaken; they are contraindicated in the presence of these findings.



16—93. Sit-back abdominal exercise. From seated, knee-flexed position with foot stabilization, the individual leans back to varying degrees to hold an isometric contraction. Exercise can be varied by leaning further back, placing the arms behind or over the head to add leverage to the weight.

16—94. Shoulder lift, hook-lying sit-up. Starting position: same as hook-lying sit-up. Trunk is flexed only to the point of lifting scapula from the table surface.

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Chapter 17

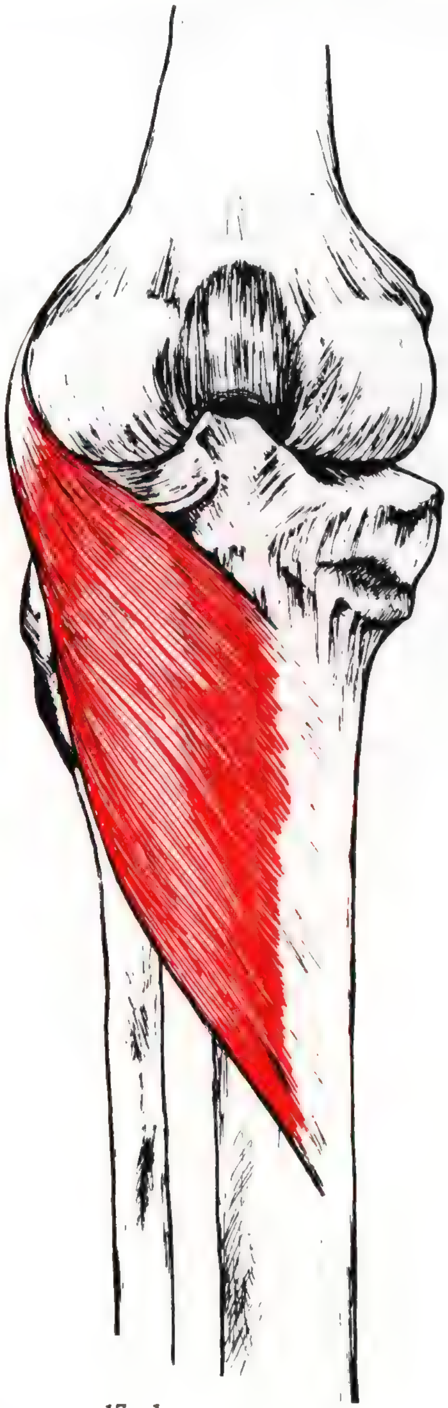
Leg and Foot Muscles

Popliteus

Origin: Lateral condyle of femur, posterior horn of lateral meniscus, fibular head.

Insertion: Triangular area on posterior surface of tibia above soleal line.

Action: Rotates the tibia medially on the femur or the femur laterally on the tibia, depending on the one fixed. Withdraws the meniscus during flexion, and provides rotatory stability to the femur on the tibia.[4] Brings the knee out of the "screw home" position of full extension. Helps with posterior stability of the knee.



17—1.

Testing Position: Prone patient flexes knee to 90° and medially rotates the tibia on the femur.

Patient Fixation Requirements: The foot is used to impart rotation to the tibia. The ankle must be fixed, and there must be no pathology in the ankle, foot, or knee to cause pain to the patient.

Stabilization: The examiner must make certain that the patient does not rotate the femur, or flex or extend the knee.

Test: Pressure is directed on the distal medial foot, with counter-pressure on the calcaneus to impart lateral rotation of the tibia on the femur. The actual testing motion is slight and can be evaluated only by observing the tibia rotating on the femur and watching for motion of the tibial tubercle. It is quite possible for the examiner to obtain foot rotation, appearing to be a weak popliteus; in fact, it is a torquing of the tibia and fibula. If the examiner accidentally stimulates a subluxation or other problem in the foot or ankle, the procedure may produce erroneous results.

Body Language of Weakness:

Testing position: In the presence of extreme weakness, the patient will be unable to rotate the tibia medially on the femur.

During test: The patient may attempt to change the parameters of the test by knee flexion, extension, or femur rotation.

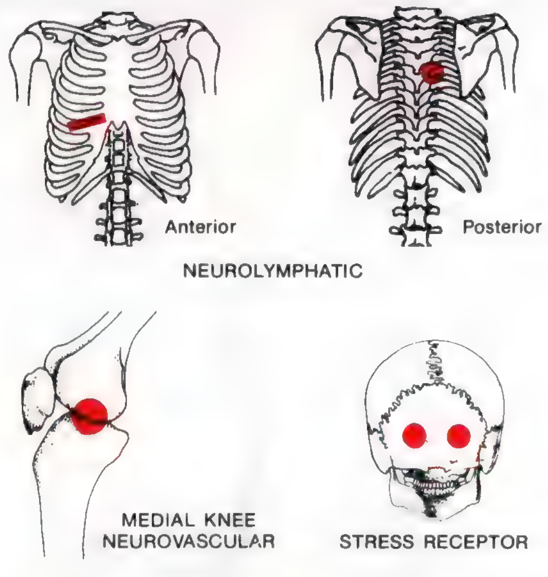
Postural imbalances: The patient may stand with a hyperextended knee as compensation for failure of the popliteus to give good posterior knee stabilization. There will be lateral rotation of the tibia on the femur, giving an appearance of external rotation of the entire leg; actually, it is of the tibia and foot only. Weakness of the popliteus is best observed on a postural basis when the patient is in a relaxed, seated position with his leg hanging freely from the examination table. Weakness will cause the tibial tubercle to be lateral to the leg's midline.

Alternate Testing Methods: The test can be done in the seated or supine position. When done in the supine position, the patient flexes both the hip and the knee to 90°. The test is continued as in the other positions; however, the patient must fix the hip more adequately to avoid femur movement.

17—2. Examiner observes for tibial tubercle movement.

17—3. Tibial tubercle posterior at the beginning of test.

17—4. Movement of the tibial tubercle in the presence of popliteus weakness.



Nerve Supply: Tibial, **L4, 5, S1**

Neurolymphatic:
- **Anterior:** 5th intercostal space from mid-mammillary line to sternum on right.
- **Posterior:** Between T5-6 laminae on right.

Neurovascular: Medial aspect of knee at meniscus.

Reactive Muscle Correlation: Gastrocnemius, hamstrings, and upper trapezius.

Nutritional: Vitamin A

Meridian Association: Gall bladder

Organ Association: Gall bladder

General Discussion: Bilateral popliteus weakness indicates a probable mid-cervical functional fixation of the vertebrae. Correction of the fixation will immediately restore strength to the muscles.

The popliteus origin at the posterior horn of the lateral meniscus of the knee is a source of considerable involvement when this muscle is weak.

Basmajian and Lovejoy,[4] using bipolar fine-wire electromyography, demonstrated with dynamic studies that the popliteus is more involved with rotation than with flexion. They also concluded that the popliteus is important in drawing the lateral meniscus posterolateral during flexion of the knee and medial rotation of the tibia. This helps prevent forward dislocation of the femur on the tibia during flexion of the knee, and is accomplished by continuous marked activity of the popliteus in the semi-crouched, knee-bent position.[1, 14]

Gastrocnemius

Origin:
  Medial head: medial condyle and adjacent part of femur. Capsule of knee joint.
  Lateral head: lateral condyle and posterior surface of knee joint.

Insertion: Into calcaneus by Achilles tendon.

Action: Plantar flexes foot.

Reversed Origin-Insertion and Change of Action: Flexes knee. Dorsiflexion of foot increases knee flexion capability. Since the gastrocnemius originates above the knee and the soleus below the knee, the differentiating factor in testing the two muscles is the knee position during the test.

Testing Position: The testing position for the gastrocnemius is prone, with the foot over the end of the table and the leg straight.

Synergists: Soleus, plantaris, tibialis posterior, peroneus longus and brevis, flexor hallucis longus, flexor digitorum longus.

Test: Examiner pulls distally on calcaneus and simultaneously directs pressure on the sole of the foot in a dorsiflexion direction. This test must be compared with the soleus test to make a differential diagnosis.

Body Language of Weakness:
  Postural imbalance: Patient stands with hyperextension of knee, compensating for a weak gastrocnemius failing to give posterior stability to the knee. This also correlates with a weak popliteus and quadriceps group.

Alternate Testing Method: All plantar flexors can be tested with the patient standing. The patient stabilizes himself with his hand on a table or wall, but does not use it to aid the test. The patient raises directly up on his toes with one foot, while the examiner observes for capability of elevating to the toes without bending the knee or leaning forward.

Nerve Supply: Tibial, L4, 5, **S1, 2**

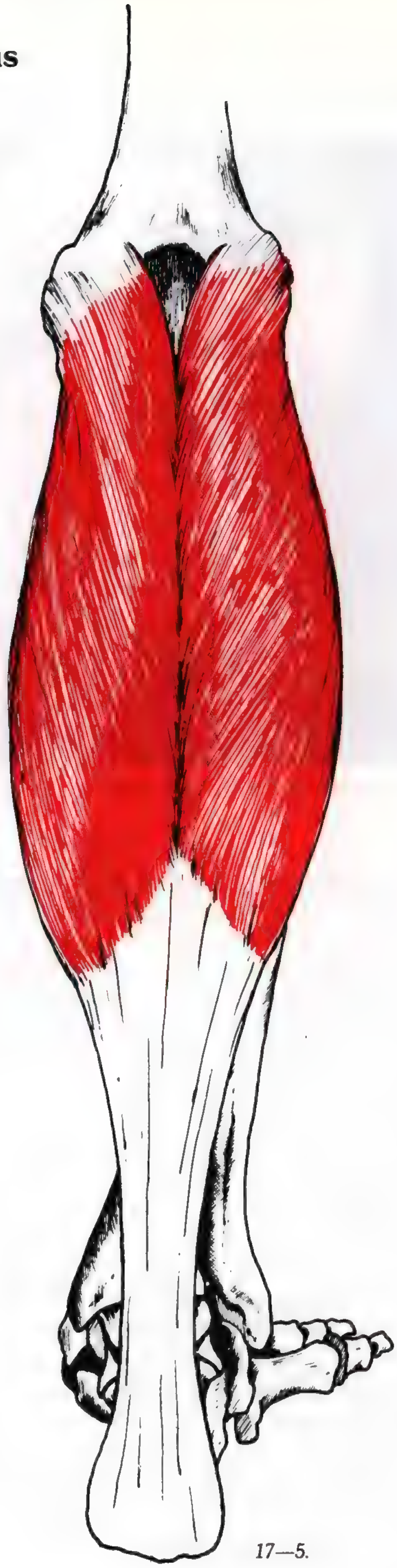
Neurolymphatic:
  Anterior: 2" above umbilicus and 1" from midline.
  Posterior: Between T11-12 bilateral near laminae.

Neurovascular: Lambda

Reactive Muscle Correlation: Popliteus, quadriceps.

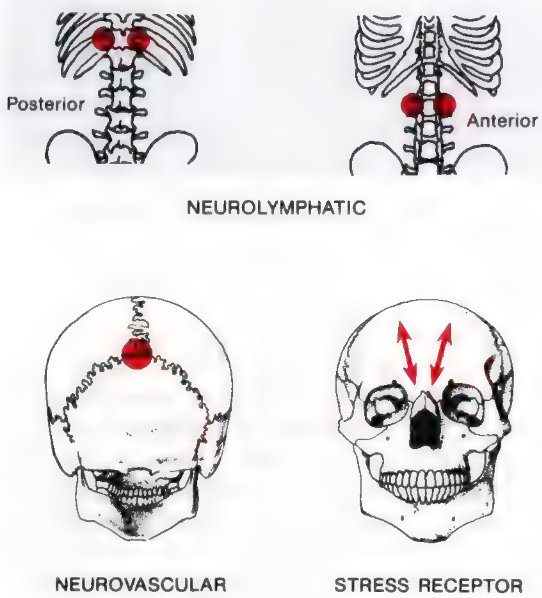
Nutritional: Adrenal concentrate or nucleoprotein extract.

Meridian Association: Circulation sex



17—5.

17—6. *Testing pressure is dorsiflexion of ankle and traction on the calcaneus.*



General Discussion: The gastrocnemius must be correlated with the soleus for evaluation of its strength. The maximum shortening of the gastrocnemius and soleus varies considerably. The soleus is capable of shortening 44 mm., the gastrocnemius only 39 mm. This is very important in the action of these two muscles. Because the gastrocnemius originates proximal to the knee, it is lengthened or shortened with extension or flexion of the knee. When the knee is flexed, the gastrocnemius is shortened, equal to or exceeding its length of contraction.[13] The prone soleus test is done in a manner similar to the gastrocnemius test, except the knee is flexed to 90°; this shortens the gastrocnemius and reduces its activity in the test.

The origin of the gastrocnemius above the knee is very important in the muscle's role in the gait mechanism. As the knee is extended by quadriceps action, the gastrocnemius is lengthened to its most advantageous functioning position. Thus the action of the

Gastrocnemius (continued)

quadriceps transfers more power to the ankle by the gastrocnemius.[13] Herman and Bragin[9] demonstrated by electromyography that the gastrocnemius is more sensitive to contractions of length, strength, and rate of contraction, and the soleus plays a more constant role. This correlates with the generally acknowledged fact that the gastrocnemius is a gait mechanism muscle for running, jumping, and quick actions. It plays its greatest role when the ankle is plantar-flexed in large contractions and in the rapid development of tension. The soleus, again, plays a more constant role in postural balance.

By superimposing electromyograms over motion pictures of the gait, Sutherland[17] demonstrated that knee extension in the stance phase of gait cannot be from quadriceps muscle action. The EMG shows that quadriceps activity stops prior to knee extension. The plantar flexors are active during knee extension, yet dorsiflexion of the foot continues. He presents the hypothesis ". . . that knee extension during the stance phase in ordinary walking on the level is brought about by the force of the ankle plantar flexors resisting the dorsiflexion of the ankle, this dorsiflexion being produced by the resultant of the extrinsic forces (kinetic forces, gravity, and the floor reaction). The resultant of the extrinsic forces is greater than the intrinsic force, as manifested by the increasing dorsiflexion of the foot which occurs up until heel-off begins."

The postural position of hyperextension of the knee in the presence of a weak gastrocnemius compensates for failure of its normal action in maintaining the knee in a slight degree of flexion. The medial head of the gastrocnemius is more active than the lateral in maintaining this position.[11]

The gastrocnemius-soleus combination is not often tested in applied kinesiology in reference to its glandular correlation because of the difficulty in testing these very powerful muscles with the limited leverage available. The gastrocnemius supplies most of its information about glandular correlation from the associated tenderness that usually develops in the muscle when there is adrenal involvement.

The gastrocnemius is often involved in athletic injuries on a reactive muscle basis. The muscle dysfunction may be primary, causing a weakness in another area, or it may be secondary and develop weakness from another muscle previously contracting. As stated, the popliteus and quadriceps are often involved with the gastrocnemius on a reactive muscle basis. Usually when these muscles are involved, there is a knee disturbance manifested when running and with consequent cutting action.

Persistent wearing of high heels may cause a shortness of the gastrocnemius, soleus, and Achilles tendon. Goniometer measurement should show 15° dorsiflexion. When there is limited range of motion, differential diagnosis between shortness of the gastrocnemius and soleus can be obtained by comparing foot dorsiflexion. If the gastrocnemius is short and the foot is dorsiflexed, there will be a restriction of knee extension. If the knee is extended, there will be a restriction of dorsiflexion.

17—7. Test includes all plantar extensor muscles.

Soleus

Origin: Posterior surface of the head and upper 1/3 of the shaft of the fibula. Middle 1/3 of the medial border of the tibia, tendinous arch between tibia and fibula.

Insertion: Into calcaneus with gastrocnemius by way of the Achilles tendon.

Action: Plantar flexes foot.

Reversed Origin-Insertion and Change of Action: When the individual is standing, the calcaneus becomes the fixed origin of the muscle. The muscle's action is important in stabilizing the tibia on the calcaneus in the standing position, and limiting forward sway.

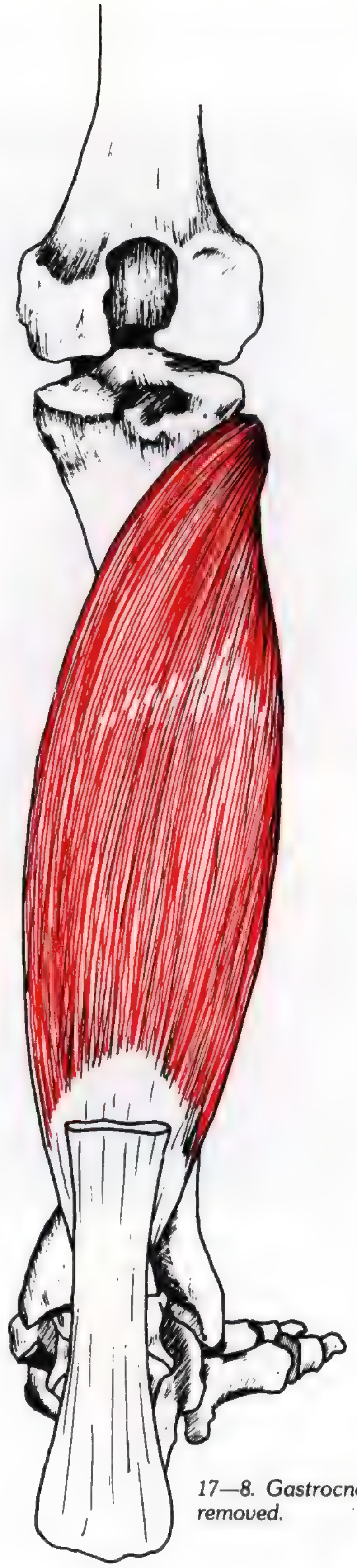
Testing Position: Patient is prone, with knee flexed to 90°. The knee flexion puts the gastrocnemius at a disadvantage for plantar flexing the foot. The examiner directs traction on the calcaneus and pressure on the sole of the foot in a direction of dorsiflexion (see gastrocnemius, page 333, for rationale of flexing knee for this test).

Stabilization: Additional differentiation between the gastrocnemius and soleus can be obtained by having an assistant stabilize the leg in the 90° flexed position. The patient adds an attempt to extend the knee by quadriceps action, which causes reciprocal inhibition to the gastrocnemius.

Synergists: Gastrocnemius, plantaris, tibialis posterior, peroneus longus and brevis, flexor hallucis longus, and flexor digitorum longus.

Body Language of Weakness:

- **Testing position:** As the patient plantar flexes the foot, the gastrocnemius-soleus action on the Achilles tendon gives straight plantar flexion if the entire group of muscles is functioning normally. If the foot moves into inversion with plantar flexion, it indicates either recruitment of the synergist tibialis posterior and toe flexors, or weakness of the peroneus longus and brevis. If the foot moves into plantar flexion with eversion, it indicates recruitment of the synergists peroneus longus and brevis, or weakness of the medial muscles, the tibialis posterior and toe flexors.
- **During test:** An effort to include inversion in the test indicates recruitment of one or all of the tibialis posterior, flexor hallucis longus, or flexor digitorum longus muscles. Attempts to evert the foot, along with plantar flexion, indicate recruitment of the peroneus longus and/or brevis.
- **Movement aberrations:** Difficulty in rising onto the toes or walking on them.



17—8. Gastrocnemius removed.

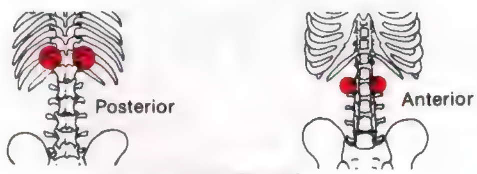
Soleus (continued)

Postural imbalances: Weakness causes a general forward body lean if the gastrocnemius is not also weak.

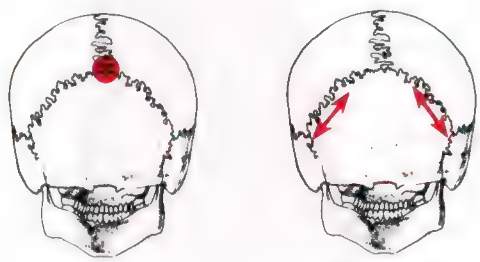
Nerve Supply: Tibial, L4, 5, **S1, 2**

Neurolymphatic:
Anterior: 2" above umbilicus and 1" from midline.
Posterior: Between T11-12 bilateral near laminae.

Neurovascular: Lambda



NEUROLYMPHATIC



NEUROVASCULAR STRESS RECEPTOR

Nutritional: Adrenal concentrate or nucleoprotein extract.

Meridian Association: Circulation sex

Gland Association: Adrenal

General Discussion: The soleus is not usually tested in applied kinesiology unless there is the possibility of gross muscular weakness, or an evaluation is being made for reactive muscles.

The gastrocnemius and soleus have typically been known as the triceps surae because the two heads of the gastrocnemius and the soleus insert into a common tendon. Campbell et al.[6] have demonstrated electromyographically that these muscles, in reality, act as a quadriceps surae since the medial and lateral aspects of the soleus are capable of acting independently. O'Connell,[16] using surface and needle electrodes, also found that the medial and lateral aspects of the soleus act independently. This medial and lateral action of the gastrocnemius and soleus correlates with a medial or lateral calcaneus subluxation, which is found in applied kinesiology by using the challenge mechanism. Usually the subluxation correlates with a tarsal tunnel syndrome, where the calcaneus is also posterior. The calcaneus will usually be lateral, and there will be weakness on the medial head of the gastrocnemius and the medial aspect of the soleus. This gives poor medial support to the calcaneus, allowing it to deviate laterally. As with other structural distortions, it is necessary to return the muscles to normal balance to obtain maximum correction. Since the gastrocnemius and the soleus are very difficult to evaluate by standard muscle testing, it is best to evaluate the medial and lateral aspects by therapy localization directly to the muscle. The most common disturbance is dysfunction of the neuromuscular spindle cell or Golgi tendon organ. There may also be a muscle stretch response on the tight side of the muscles.

The gastrocnemius has a higher concentration of fast muscle fibers than the soleus. The gastrocnemius is primarily a muscle for fast, quick action, whereas the soleus is a postural muscle for prolonged use. The fatigue characteristics of the gastrocnemius and soleus were studied by Ochs et al.[15] with electromyography. The soleus muscle has a mean of about 70% slow muscle fibers, which are the oxidation type, and 30% fast glycolytic fibers. The gastrocnemius is equally divided, with 50% of each. The action potential of the gastrocnemius decreased more rapidly than the soleus, indicating a faster fatigue of the gastrocnemius.

The gastrocnemius and soleus are in their neutral positions when there is about 30° of plantar flexion; consequently, when in an upright position, the muscles are slightly stretched, taking the slack out of the tendon and keeping the muscles in a position of functional readiness.[11] In the standing position, the gastrocnemius and soleus' origin and insertion are reversed, making the foot the base and the origin for muscle action. In the relaxed standing position, the stretch reflex is constantly monitoring the anterior and posterior sway of the body, activating the soleus and anterior tibial for balance. During normal standing, the line of gravity is in front of the ankle joint; the soleus muscle maintains a tonic contraction to prevent the body from falling forward.[16]

The glandular association of the gastrocnemius and soleus with the adrenal provides body language to indicate when adrenal involvement may be present. The patient will complain of aching in the calves of his legs, especially after being on his feet for a period of time. There will be tenderness in the soleus-gastrocnemius complex when squeezed by the examiner. Of course, this tenderness must be differentiated from vascular conditions and direct metabolic problems with the muscle, such as calcium deficiency causing hypertonicity, etc.

17—9. Flexing the knee to 90° helps take the gastrocnemius out of the soleus test.

Tibialis Anterior

Origin: Lateral condyle of tibia, proximal 2/3 of lateral surface of tibia, interosseous membrane, deep fascia and lateral intermuscular septum.

Insertion: Medial and plantar surface of medial cuneiform, and base of 1st metatarsal.

Action: Dorsiflexes foot and inverts it.

Reversed Origin-Insertion and Change of Action: When in the standing position, the foot is fixed and becomes the origin for the muscle. Action causes forward body lean antagonistic to the plantar flexion of the soleus and gastrocnemius. Active in the balance mechanism of anterior and posterior sway.[16]

Testing Position: Supine patient places foot in inversion and dorsiflexion, with the toes preferably kept in flexion. If the patient cannot keep them flexed they should be neutral, without any extension.

Stabilization: The examiner stabilizes the leg above the ankle.

Synergist: Extensor hallucis longus, extensor digitorum longus.

Antagonist: If there is shortness of the gastrocnemius, the test should be performed with the knee in the flexed position to allow greater dorsiflexion.

Test: Pressure is directed against the medial dorsal surface of the foot in the direction of plantar flexion and eversion. Examiner should see effective contraction of tibialis anterior as indicated by the tendon elevation during the test.

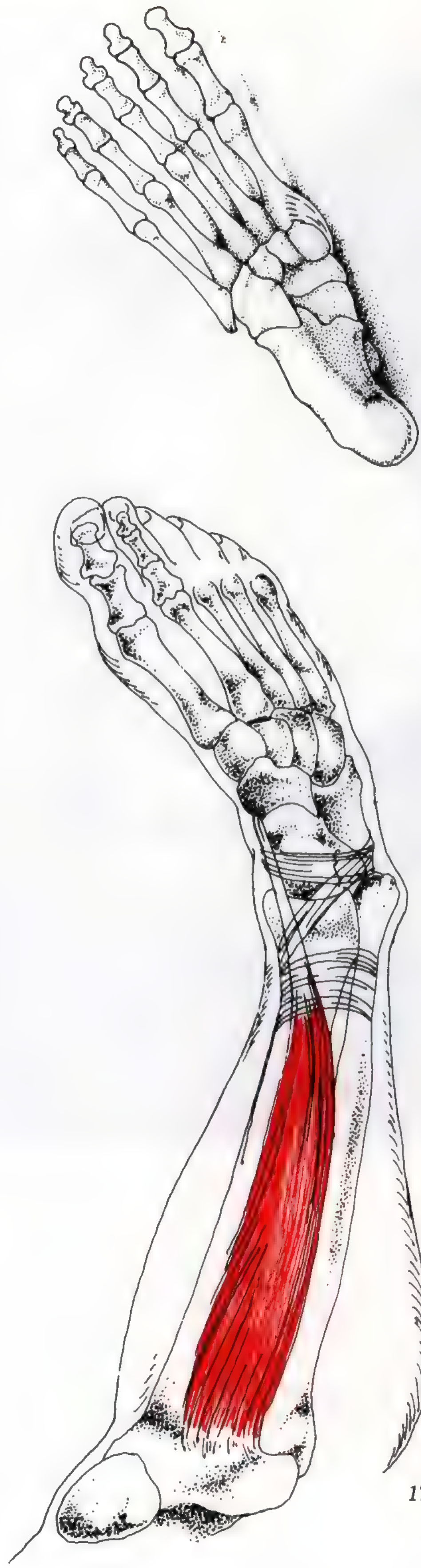
Alternate Testing Methods: The test can be performed in the seated position, or in the prone position when the knee is flexed. This may be necessary for testing reactive muscles.

Body Language of Weakness:

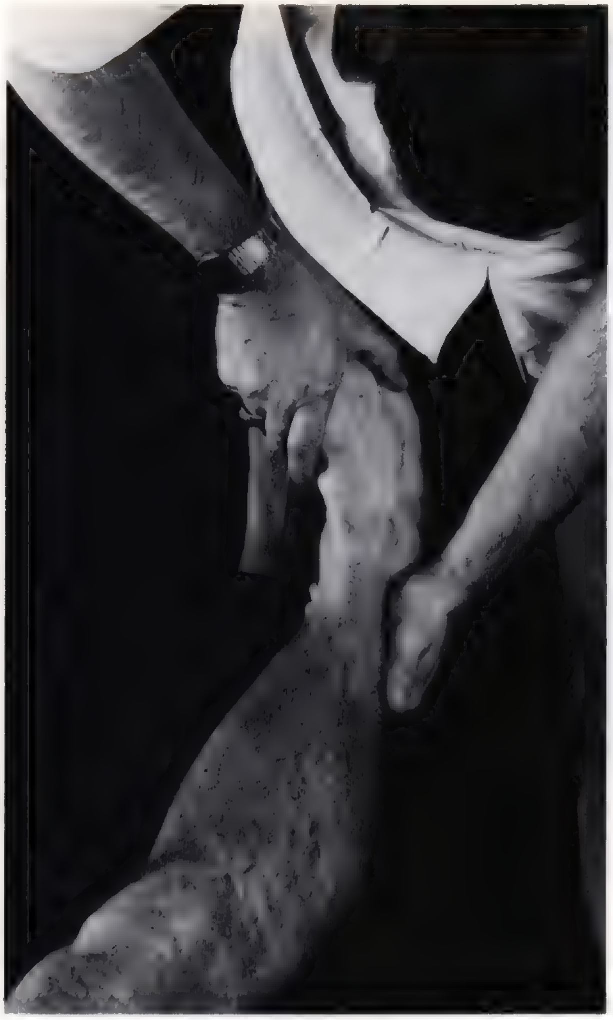
During test: Patient attempts to extend the toes to recruit synergistic action of the extensor digitorum longus and the extensor hallucis longus when the tibialis anterior is weak. The ideal test minimizes the contraction of these muscles, as indicated by their tendons not rising or the toes extending. Pain in the muscle is often associated with shin splints.

Movement aberrations: Tendency toward foot drop. Foot drop must be significant before toe shoe wear will give indication of it. A peak of electromyographic activity occurs at toe-off of the stance phase of gait. This is apparently to dorsiflex the ankle, permitting the toes to clear the floor.[2]

Postural imbalances: The tibialis anterior is a medial ankle stabilizer. In the supine relaxed



17—10.



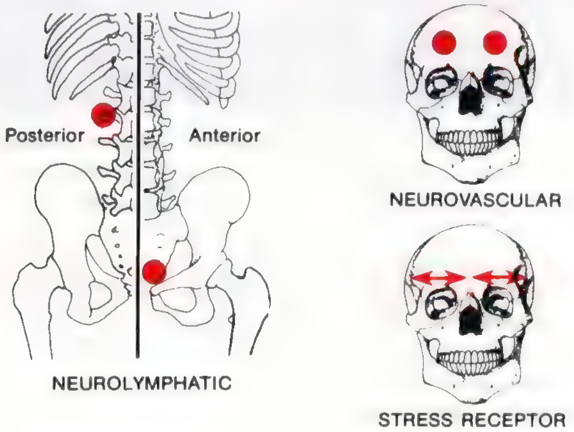
17—11.

Meridian Association: Bladder

Organ Association: Urinary bladder

General Discussion: This muscle is often associated with shin splints. When present, the treatment is frequently origin/insertion, proprioceptive, or fascial release technique. When shin splints are present, there will usually be pain during the muscle test; this should be dramatically relieved after treatment.

In the relaxed standing position, the only activity of the tibialis anterior is controlling sway.[16] In a normal foot, there is no electrical activity of this muscle to support the arch when in the standing position. Basmajian and Stecko[5] studied the muscles of the normal foot and leg and their influence on arch maintenance by electromyography while weight-loading the foot. The subject was in a seated position, and the load was placed on the knee to transmit through the vertical leg to the foot; thus there was no possible influence by postural swaying. Activity of the



tibialis anterior was demonstrated with a weight of 400 pounds placed on the knee, but not with all subjects. Gray[8] studied both normal and flat feet, and found that in the normal standing position there was marked activity on EMG in 23 out of 27 subjects with flat feet — a significant contrast to six subjects tested with normal feet which revealed only one subject with slight activity; five showed none.

In free movement of dorsiflexion, electromyography shows that the tibialis anterior begins the motion, followed by contraction of the extensor digitorum longus. Near the end of the motion, the extensor hallucis longus participates in the action.[18] This seems to indicate that the primary synergist to the tibialis anterior muscle is the extensor digitorum longus. The extensor hallucis longus probably is more active in the foot inversion position in which the tibialis anterior is tested than it is in straight dorsiflexion. The examiner can limit these muscles in the test by being certain there is no toe extension during the procedure.

position, there will be deviation of the foot laterally. It can be evaluated with an imaginary line drawn down the anterior tibial ridge, which should extend into the second toe. When evaluating the foot for balance in the supine position, care must be taken that the foot is not being deviated from its relaxed position by pressure on the calcaneus by the table. It is best to have the patient in a position where the foot is hanging freely over the end of the examination table.

Nerve Supply: Peroneal, **L4, 5,** S1

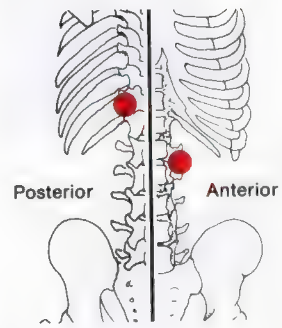
Neurolymphatic:
- **Anterior:** 3/4" above symphysis pubis.
- **Posterior:** L2 transverse process.

Neurovascular: Bilateral frontal bone eminences.

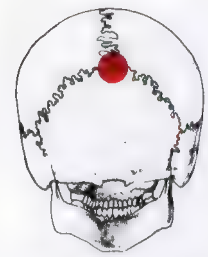
Reactive Muscle Correlation: Sartorius

Nutritional: Vitamin A

Tibialis Posterior



NEUROLYMPHATIC



NEUROVASCULAR

Origin: Lateral part of posterior surface of tibia, medial 2/3 of fibula, interosseous membrane, intermuscular septa, and deep fascia.

Insertion: Tuberosity of navicular bone, plantar surface of all cuneiforms, plantar surface of base of 2nd, 3rd, and 4th metatarsal bones, cuboid bone, and sustentaculum tali.

Action: Inverts and plantar flexes foot. Medial ankle stabilizer.

Testing Position: It is very important that the patient completely plantar flex the foot and then invert it as much as possible, keeping the toes in a flexed position.

Stabilization: Examiner stabilizes the leg above the ankle joint.

Synergists: Flexor hallucis longus and flexor digitorum longus.

Test: Examiner places hand on the medial side and over the foot. Pressure is directed against the medial side of the foot in the direction of eversion. The examiner should observe for the rising tendon of the tibialis posterior when the muscle contracts.

Body Language of Weakness:

Testing position: In the presence of weakness, the patient will have difficulty bringing his foot into inversion after complete plantar flexion and toe flexion are obtained.

During test: The examiner's hand above the toes can immediately feel when extension is being done to recruit the tibialis anterior and change the parameters of the test.

Movement aberrations: A rolling into pronation is observed when the patient walks.

Postural imbalances: Foot pronation.

Nerve Supply: Tibial, **L5, S1**

Neurolymphatic:

Anterior: 2" above the umbilicus and 1" from the midline.

Posterior: Between T11-12, bilateral by laminae.

Neurovascular: Lambda

Nutritional: Adrenal concentrate or nucleoprotein extract

Meridian Association: Circulation sex

Organ-Gland Association: Adrenal (possibly urinary bladder)

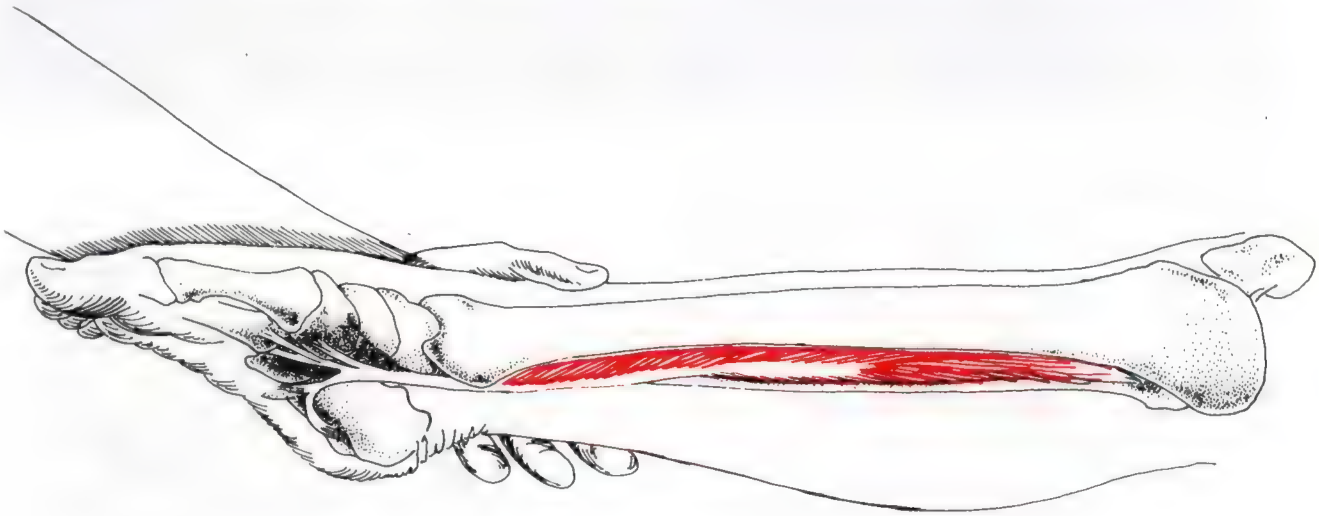
General Discussion: In the early days of applied kinesiology, the tibialis posterior was thought to be infrequently weak. Improved testing procedures as outlined here have revealed that the tibialis posterior is often found weak. It contributes to much foot dysfunction and is often involved with foot pronation.

As with other muscles associated with the foot, the primary weakness of the tibialis posterior is often due to a foot subluxation. When muscles of the foot are weak, it is of value to challenge the foot in its many different aspects in an attempt to find a subluxation affecting the muscle. If a positive challenge is found which strengthens the muscle, the subluxation is probably the primary cause of weakness and should be corrected first. Neurolymphatic reflex, neurovascular reflex, and other treatment approaches will probably strengthen the muscle; however, if a foot subluxation is primarily responsible for the weakness, the other corrections will not hold. As soon as the patient walks, the muscle weakness will usually return until the subluxation in the foot is corrected.

Basmajian et al.[5] studied the static-loaded normal foot which showed no activity with a 100-pound load, slight activity in some subjects with a 200-pound load, and greatest activity of all of the muscles tested with a 400-pound load. A comparative study of normal and flat feet by Gray[8] confirmed Basmajian and his co-workers' findings for normal feet, but revealed marked activity in 23 of 27 subjects with flat feet studied when in a comfortable standing position.

Activity of the tibialis posterior is important in stabilization of the ankle mortise. Kapandji[13] points out that the distal tibiofibular articulation is a syndesmosis without articular cartilage, and the two bones are not in contact with each other. The change of relationship of the medial and lateral malleolus is necessary to accommodate the trochlear surface of the talus, which is wider at the anterior than the posterior by approximately five millimeters. In plantar flexion, the intermalleolar space must narrow to

17—12. Foot must first be brought to full plantar extension and then inversion. Observe for attempts at toe extension or dorsiflexion.



17—13.

maintain articular stability on the narrower portion of the trochlear surface of the talus. The movement of the distal tibiofibular articulation is nicely accomplished in plantar flexion by the double pennate arrangement of the muscle fibers. The tibialis posterior contributes to plantar flexion of the foot, which requires reduction of the intermalleolar space. As the posterior tibial contracts, it pulls through its double pennate arrangement on the tibia and fibula, approximating them, which reduces the intermalleolar space and keeps the ankle mortise tight. In dorsiflexion, the tibialis posterior is relaxed, allowing the intermalleolar space to widen to accommodate the wider portion of the trochlear surface of the tibia.

Peroneus Tertius

Origin: Lower 1/3 of the anterior surface of the fibula and adjacent intermuscular septum.

Insertion: Dorsal surface of the base of the 5th metatarsal.

Action: Dorsiflexes and everts the foot.

Testing Position: The patient is best tested in the supine position. He brings the foot into dorsiflexion and eversion, with the toes kept in the neutral position or toward flexion.

Stabilization: The examiner stabilizes the leg above the ankle. This is much easier to accomplish in the supine position.

Synergists: The extensor digitorum longus assists in the peroneus tertius test. The peroneus tertius is a part of the extensor digitorum longus and might be described as its 5th tendon. The extensor digitorum longus is best kept out of the test by having the toes neutral or slightly flexed.

Test: Pressure is directed against the dorsal lateral surface of the 5th metatarsal in the direction of plantar flexion and inversion. The examiner should evaluate the tendon of the peroneus tertius and the tendons of the extensor digitorum longus for best direction to maximize the effect of the peroneus tertius and minimize that of the toe extensors.

Body Language of Weakness:

- **Testing position:** When the peroneus tertius is weak, it is difficult for the patient to move into the testing position without extension of the toes.
- **During test:** The toes attempt to extend from the neutral or slightly flexed position.
- **Postural imbalances:** The peroneus tertius gives some lateral stabilization to the ankle. Lack of lateral stabilization is best seen when the patient is in the supine position. The foot inverts, causing an imaginary line drawn along the tibial ridge to intersect the foot lateral to the second toe. There may also be a lack of support to the lateral longitudinal arch of the foot. In the normal foot, there is no requirement of the peroneus tertius to support the lateral longitudinal arch. In the flat-footed individual, there is greater requirement of all the muscles which support the arch,[8] although there has been no direct electromyographic study of the peroneus tertius.

Alternate Testing Methods: The muscle may be tested in the seated position; however, stabilization of the leg is more difficult.

Nerve Supply: Peroneal, **L4, 5, S1**

Neurolymphatic:

- **Anterior:** inferior ramus of pubic bones.
- **Posterior:** between L5 transverse and sacrum.

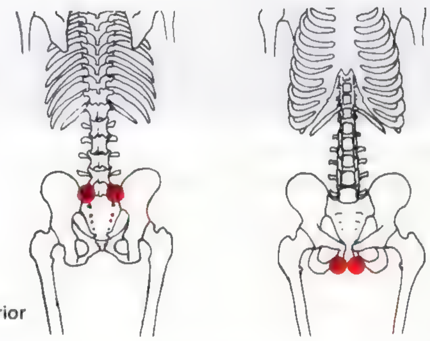
Neurovascular: Bilateral frontal bone eminences.

Reactive Muscle Correlation: Tensor fascia lata

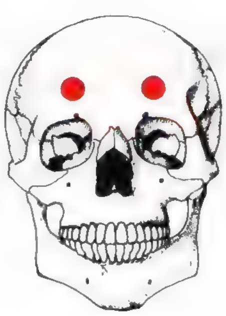
Nutritional: Calcium, B complex. Avoid oxalic acid foods, i.e., caffeine, cranberries, plums, etc.

Meridian Association: Bladder

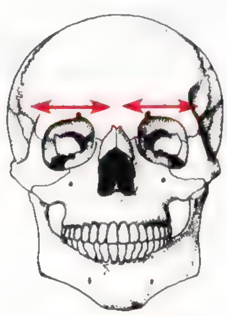
Organ Association: Urinary bladder



NEUROLYMPHATIC

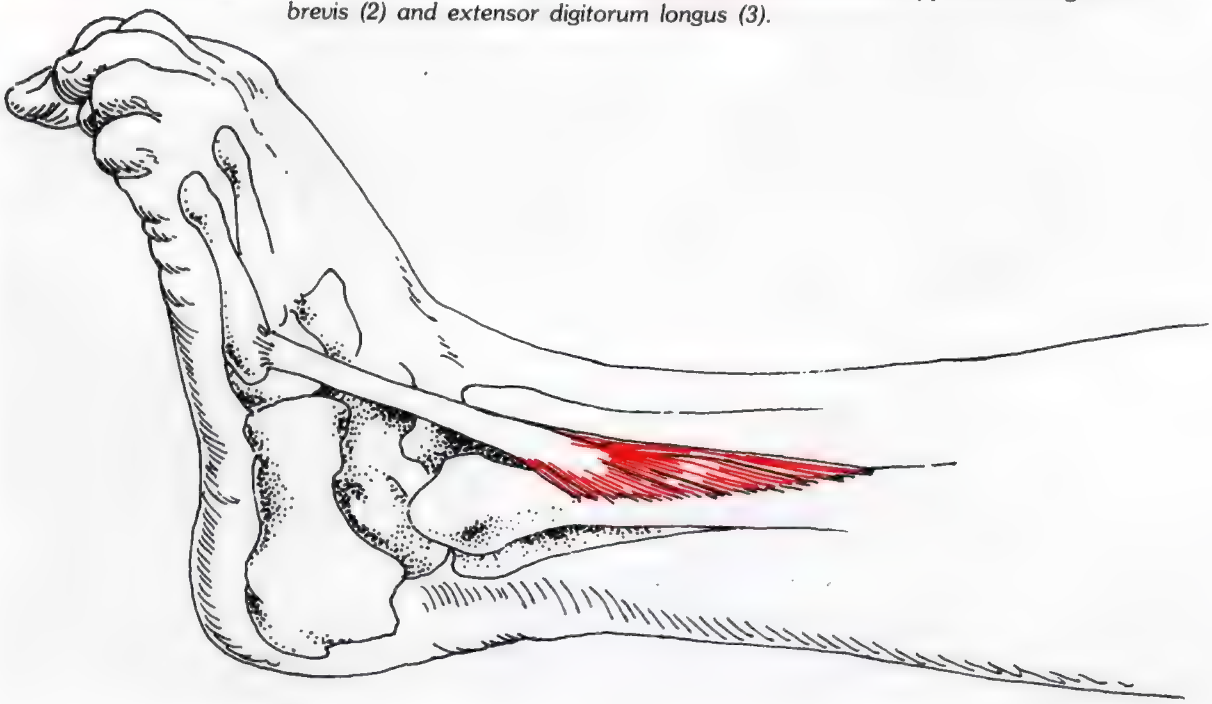


NEUROVASCULAR



STRESS RECEPTOR

17—14. *Note tendon of peroneus tertius (1), and also those of peroneus longus and brevis (2) and extensor digitorum longus (3).*



17—15.

Peroneus Longus and Brevis

The peroneus longus and brevis will be considered together because they are tested simultaneously. The primary requirement for differentiating these two muscles is the origin and insertion for tendon treatment, or attention to the Golgi tendon organs or neuromuscular spindle cells.

PERONEUS BREVIS

Origin: Lower 2/3 of fibula on lateral side and adjacent intermuscular septa.

Insertion: Lateral side of proximal end of 5th metatarsal.

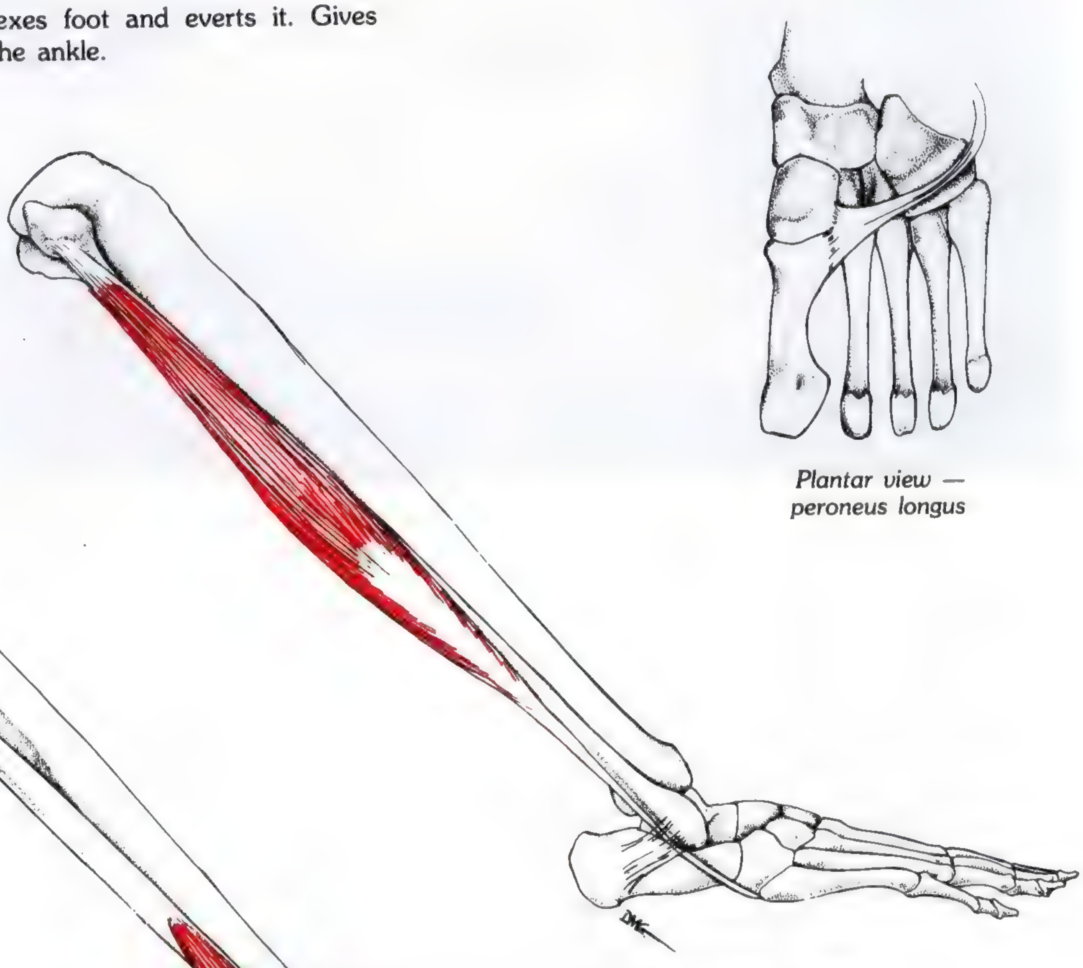
Action: Plantar flexes foot and everts it. Gives lateral stability to the ankle.

PERONEUS LONGUS

Origin: Lateral condyle of tibia, head and upper 2/3 of lateral surface of fibula, intermuscular septa and adjacent fascia.

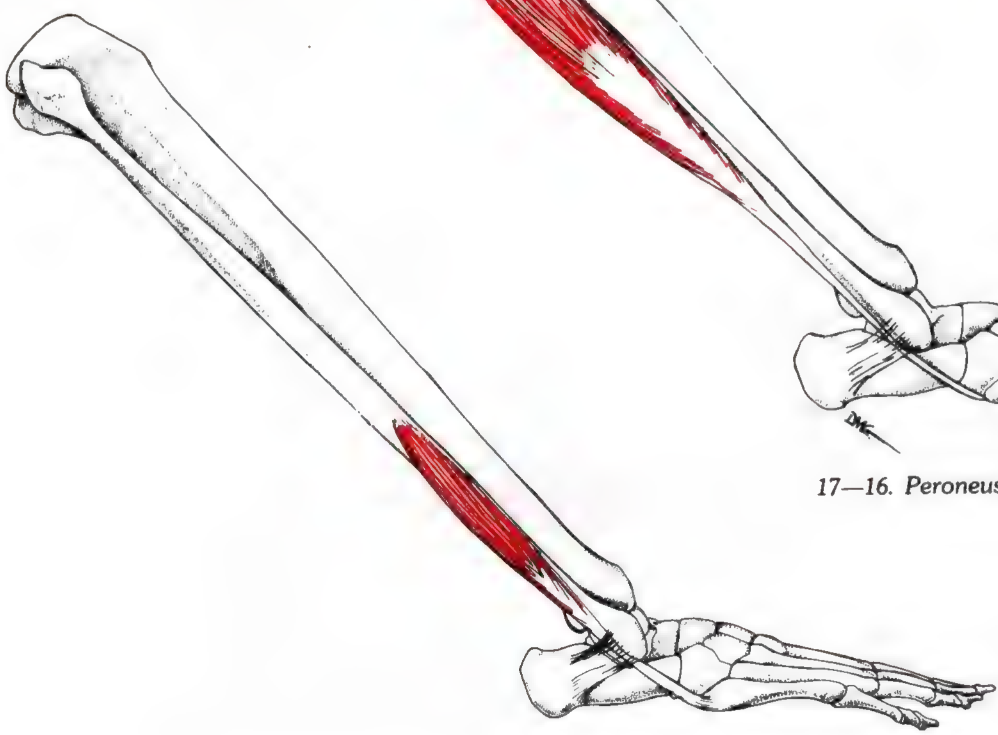
Insertion: Proximal end of the 1st metatarsal and medial cuneiform on their lateral portions.

Action: Plantar flexes foot and everts it. Gives lateral stability to the ankle.



Plantar view — peroneus longus

17—16. Peroneus longus.



17—17. Peroneus brevis.

PERONEUS LONGUS AND BREVIS

Reversed Origin-Insertion and Change of Action: When the foot is stabilized, as in standing, the peroneus longus and brevis stabilize the leg on the foot. They are synergistic to the gastrocnemius and soleus in extending the tibia and fibula at the ankle when in the standing position.

Testing Position: Supine patient fully plantar flexes the foot and then everts it to the maximum amount. The toes should be kept neutral or in flexion to limit action of the long muscles of toe flexion and extension. The testing position should be such that the muscle and tendon progressing behind the lateral malleolus are in as straight a line as possible.

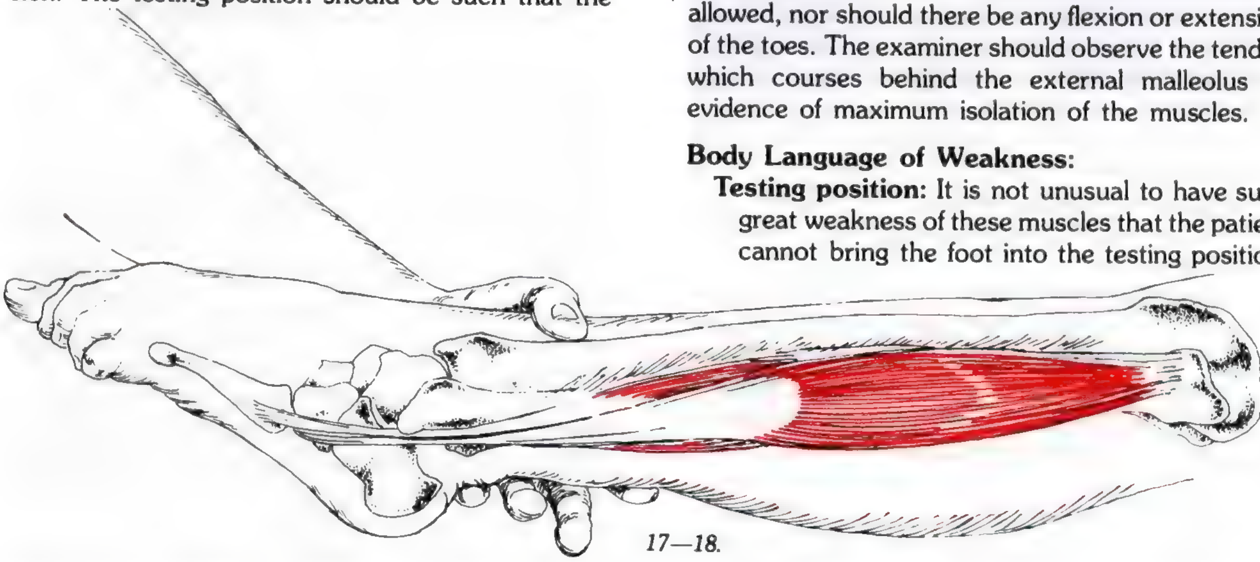
Patient Fixation Requirement: The patient must keep the foot in plantar flexion.

Stabilization: The examiner stabilizes the leg above the ankle.

Test: Pressure is directed on the side of the foot in the direction of inversion. The test must start from the maximum eversion allowed when the foot is in complete plantar flexion. The range of motion in this test is limited. No dorsiflexion of the foot should be allowed, nor should there be any flexion or extension of the toes. The examiner should observe the tendon which courses behind the external malleolus as evidence of maximum isolation of the muscles.

Body Language of Weakness:

Testing position: It is not unusual to have such great weakness of these muscles that the patient cannot bring the foot into the testing position.



17—18.

17—19. Observe tendon of peroneus longus and brevis.

Peroneus Longus and Brevis (continued)

During test: The patient's effort to recruit other muscles into this test is dramatic, and sometimes extremely difficult to stop. The patient will attempt dorsiflexion of the foot and extension of the toes. Even if the examiner prevents the patient from dorsiflexing his foot and extending the toes by holding the position, the patient's effort will change the test significantly. If dorsiflexion of the foot or extension of the toes is allowed, a strong peroneus longus and brevis may be indicated; in reality, the muscles may be exquisitely weak. In order to eliminate the dorsiflexion and toe extension, it may be necessary to restart the test several times. Once the examiner has felt the dramatic difference between testing a weak peroneus longus and brevis correctly, and the dramatic change the patient can make with dorsiflexion or toe extension, it becomes much easier to perform this test properly.

Postural balance: Balance of the ankle muscles is best observed when the patient is supine. Weakness of the peroneus longus and brevis causes the foot to invert. An imaginary line extending down the tibial ridge should extend over the second toe. Weakness of the peroneus longus and brevis causes this line to be lateral of the second toe or to miss the foot entirely. When evaluating the structural balance of the foot in the supine position, care must be taken that the foot is not resting on the table in such a manner that the table pressure deviates the foot from its relaxed position. It is best to have the foot hang over the edge of the table, or be supported by an ankle rest such as is present on most chiropractic tables.

Nerve Supply: Peroneal, L4, **5, S1**

Neurolymphatic:
Anterior: inferior symphysis pubis
Posterior: between posterior superior iliac spine and L5 spinous

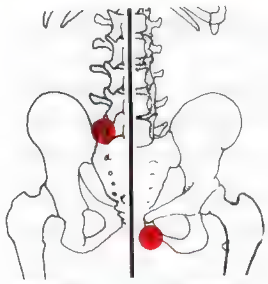
Neurovascular: Bilateral frontal bone eminences.

Nutritional: Calcium, vitamin B complex; avoid oxalic acid foods.

Meridian Association: Bladder

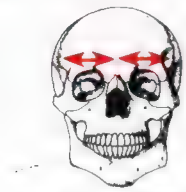
Organ Association: Urinary bladder

General Discussion: The peroneus longus and brevis are very important in maintaining normal foot and ankle function; this relates to the entire gait mechanism of the body. Weakness of these muscles is often due to foot subluxations. This can be determined by challenging the foot structures and then re-testing the peroneus longus and brevis for improved function. These muscles are important lateral ankle stabilizers.



NEUROLYMPHATIC


NEUROVASCULAR


STRESS RECEPTOR

The peroneus longus and brevis may be injured from trauma, such as when the ankle is twisted. The trauma to the muscle may require origin/insertion technique or treatment to the proprioceptors of the muscles. After the ankle strain or sprain has recovered, evaluation of the muscle(s) should be made for the possible need for treatment. Many recurrent twisted ankles are due to weakness of these muscles and their failure to recover.

Some consider that the peroneus longus (and possibly brevis) — acting together with the peroneus tertius and tibialis anterior and posterior — acts as a sling mechanism to support the arch. Basmajian et al.[5] demonstrated by electromyography that there was no activity of the peroneus longus when the static foot was loaded with up to a 400-pound load unless the foot was everted. In that case, some subjects showed marked or slight activity in the muscle. Gray,[8] in a study of normal feet compared to flat feet, confirmed Basmajian's findings for normal feet. In the subjects with flat feet, 22 of 27 showed marked activity in the peroneus longus when the subjects were in a comfortable standing position, feet spread six inches apart.

Jonsson and Rundgren[12] compared the function of the peroneus longus and brevis muscles by electromyography. Their study was unique in that the needle electrodes were confirmed to be in the appropriate muscle by injecting CO2 gas into the muscle through the insertion needle, and then evaluating by x-ray whether the needle was actually in the appropriate muscle. They found the muscles to act together qualitatively, but not necessarily quantitatively. The muscles' action was found to be primarily foot pronation.

Flexor Hallucis Longus

Origin: Lower 2/3 of posterior fibula, interosseous membrane and adjacent intermuscular septa and fascia.

Insertion: Plantar surface of distal phalanx of great toe.

Action: Flexes great toe. Continued action aids in plantar flexing the foot. Helps give medial ankle stabilization.

Testing Position and Stabilization: With the patient in the supine position, the examiner stabilizes the metatarsophalangeal articulation in slight extension, and holds the foot half-way between dorsal and plantar flexion. Patient flexes distal phalanx of great toe.

Synergists: The muscles that flex the distal phalanges of the toes and fingers are the only ones which can be 100% isolated for muscle testing. The flexor hallucis brevis attaches to the proximal phalanx and is the reason stabilization and slight extension are necessary between the proximal phalanx and the first metatarsal.

Test: From the testing position of flexion between the proximal and distal phalanx, the examiner directs pressure against the distal phalanx of the great toe in the direction of extension.

Nerve Supply: Tibial, **L5, S1, 2**

Neurolymphatic:
- **Anterior:** inferior to the symphysis pubis at the height of the obturator (same as peroneus longus and brevis).
- **Posterior:** between PSIS and L5 spinous

Neurovascular: Bilateral frontal bone eminences.

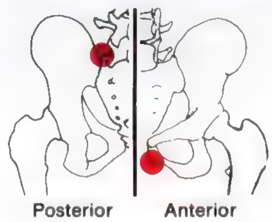
Nutritional: Raw bone concentrate correlating with tarsal tunnel syndrome or other subluxations of the foot.

Meridian Association: Circulation sex

General Discussion: The flexor hallucis longus is most frequently tested in relation to the tarsal tunnel syndrome. Because the flexor hallucis longus receives its nerve supply prior to the nerves going through the tarsal tunnel, it will be compared with the flexor hallucis brevis, which receives its nerve supply after the nerve has gone through the tarsal tunnel.

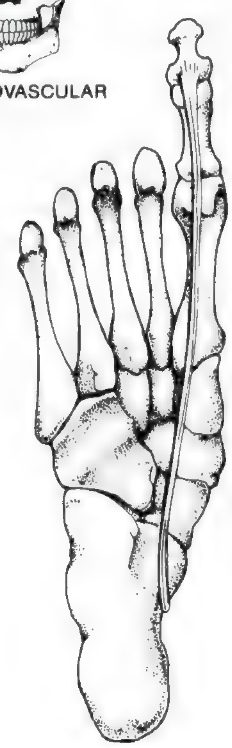
The flexor hallucis longus is inactive, or only slightly active, when evaluated electromyographically in the weight-loaded foot. With a 400-pound load, it showed its greatest activity in inversion and dorsiflexion.[5]

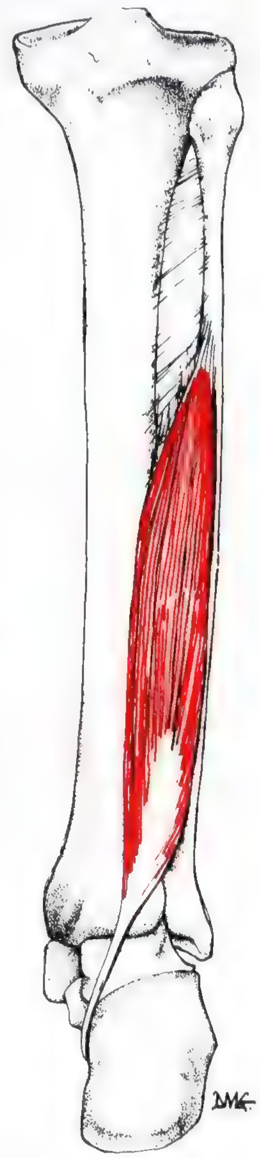
17—20. Examiner stabilizes proximal and tests distal phalanx flexion capability.



NEUROLYMPHATIC

NEUROVASCULAR





17—21.

Extensor Hallucis Longus and Brevis

EXTENSOR HALLUCIS LONGUS

Origin: Middle half of the anterior surface of the fibula and the adjacent interosseous membrane.

Insertion: Base of the distal phalanx of the great toe.

Action: Extends the distal phalanx of the great toe. Continued action extends proximal phalanx and dorsiflexes and supinates the foot.

EXTENSOR HALLUCIS BREVIS

Origin: Anterior superior medial aspect of calcaneus; lateral talocalcaneal ligament; cruciate crural ligament.

Insertion: Into proximal phalanx on the dorsal surface.

Action: Extends proximal phalanx. (Note: the extensor hallucis brevis is the medial section of the extensor digitorum brevis, which extends the proximal phalanges of the 1st-4th toes.)

Testing Position: Patient extends the great toe, with the ankle in a neutral position.

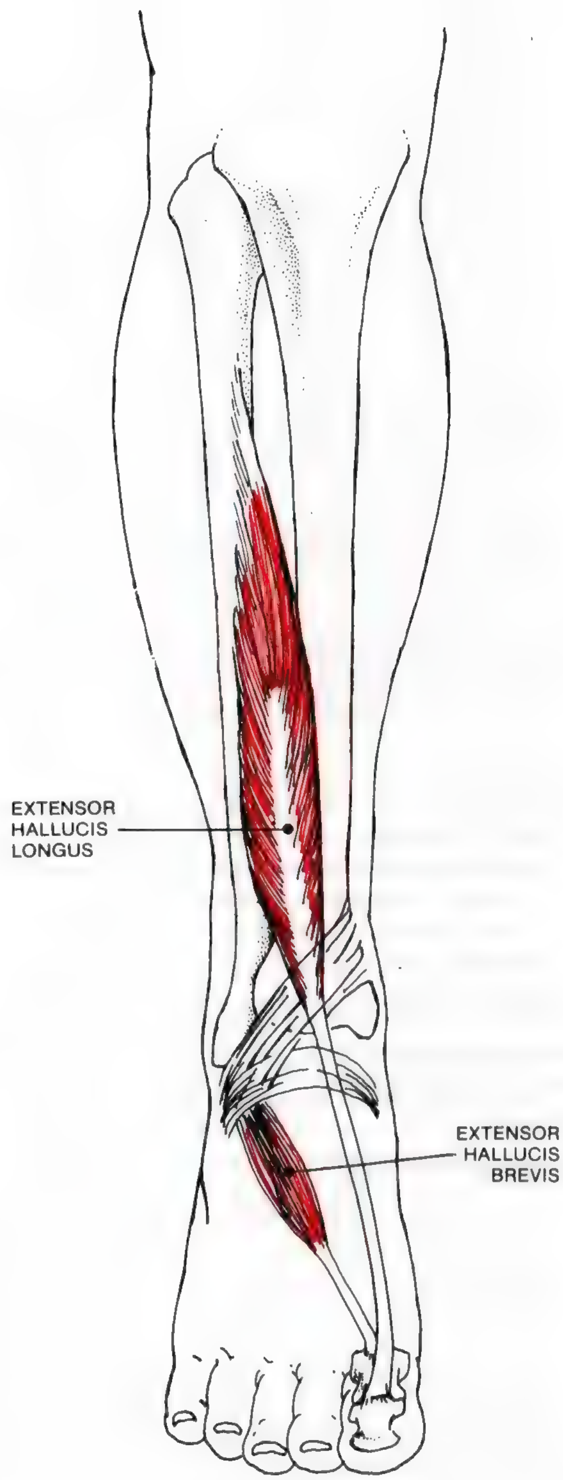
Patient Fixation Requirements: The ankle should be stabilized by both the patient and the examiner.

Stabilization: Stabilize the calcaneus with the thumb over the dorsal surface of the foot.

Test: Contact the dorsal surface of the great toe, and apply pressure in the direction of flexion. There should be no movement of the ankle joint, which may bring the tibialis anterior and other dorsiflexors into the test.

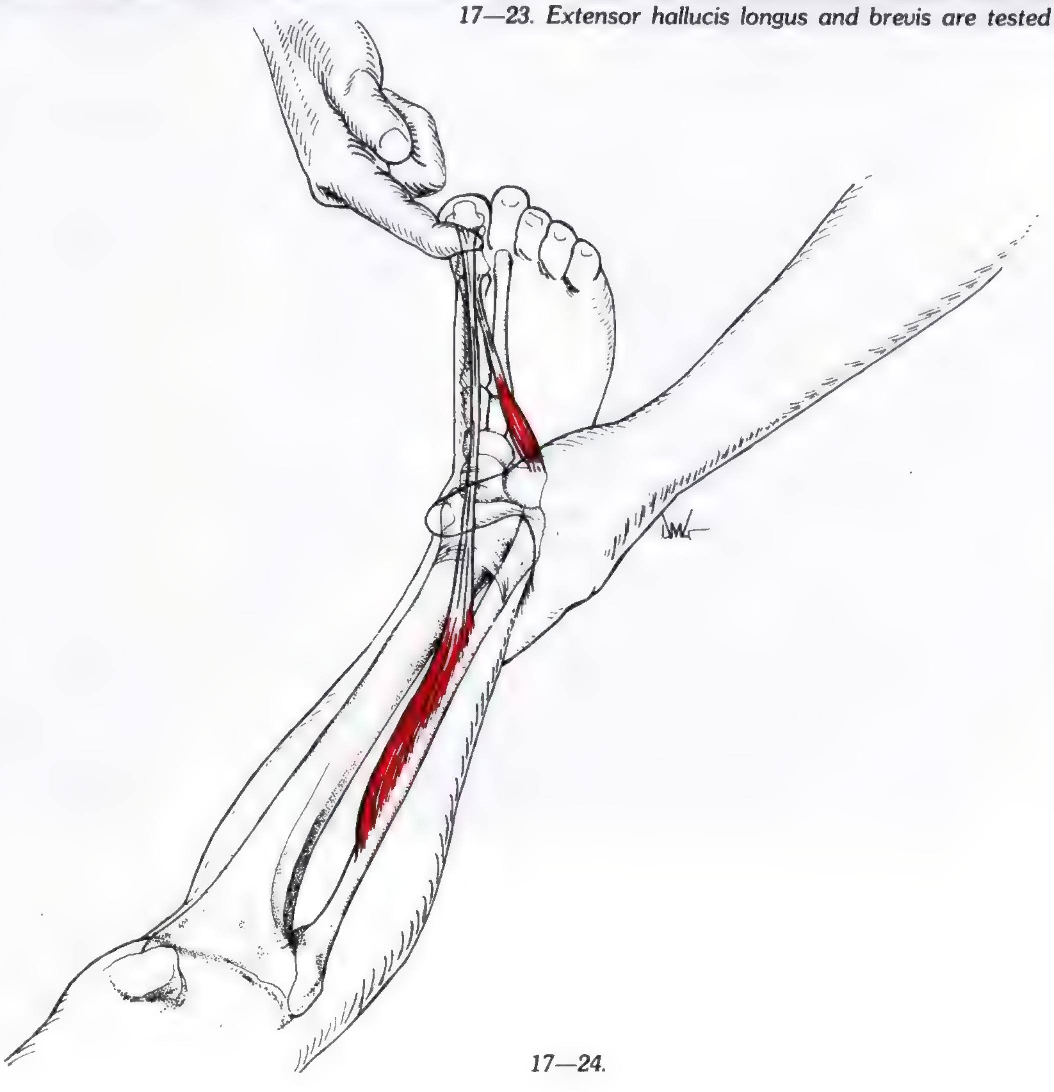
Body Language of Weakness: Inability to hold testing position. Significant weakness of this muscle is not nearly as common as other foot muscles. Weakness in the presence of lower spinal conditions and sciatic neuralgia indicates that evaluation of the 4th lumbar disc is needed.[10]

Nerve Supply: Deep peroneal, L4, **5, S1**



17—22.

17—23. *Extensor hallucis longus and brevis are tested together.*



17—24.

Extensor Digitorum Longus and Brevis

EXTENSOR DIGITORUM LONGUS

Origin: Lateral condyle of the tibia, proximal 3/4 of the anterior surface of the body of the fibula, proximal part of the interosseous membrane, deep fascia, and intermuscular septa.

Insertion: Divides into four tendons after passing under the extensor retinaculum, to insert on the proximal and middle phalanges of the 2nd-5th toes.

Action: Extends the proximal and middle phalanges of the four small toes; is a strong dorsiflexor and pronator of the foot.

Nerve Supply: Peroneal, **L4, 5, S1**

EXTENSOR DIGITORUM BREVIS

Origin: Distal and lateral surfaces of the calcaneus, distal to the groove for the peroneus brevis; lateral talocalcaneal ligament, cruciate crural ligament.

Insertion: Branches to four tendons. The first inserts into the dorsal surface of the base of the proximal phalanx of the great toe. This portion is sometimes described as a separate muscle, the extensor hallucis brevis. The other three tendons insert into the lateral sides of the tendons of the extensor digitorum longus of the 2nd, 3rd, and 4th toes.

Action: Extend the proximal phalanges of the 1st, 2nd, 3rd, and 4th toes.

Nerve Supply: Deep peroneal, L4, **5, S1**

17—25.

Testing Position: The patient extends his toes to the maximum amount.

Patient Fixation Requirements: The ankle should be stabilized by patient and examiner efforts.

Stabilization: The examiner stabilizes the foot at the calcaneus, with his thumb over the dorsal surface of the foot to prevent the patient from dorsiflexing the ankle.

Test: Contact is made on the dorsal surface of the toes, and pressure is directed toward toe flexion.

Test for Extensor Digitorum Longus and Brevis: There is considerable variation in the tendon insertion of the extensor digitorum longus and brevis.[7] The tendons of the two muscles tend to fuse together, giving a similar action to both. The extensor digitorum longus has the added action of dorsiflexion and contributes to eversion or pronation. These muscles are not routinely examined in applied kinesiology; the most common examination purpose is to determine the relative strength of the toe extensors to the flexors, to evaluate the extension of the metatarsophalangeal articulations in the "hammer toe" position.

17—26. Extensor digitorum longus and brevis are tested together.

INTRINSIC MUSCLES OF THE FOOT

The intrinsic muscles of the foot are usually evaluated in applied kinesiology when there are subluxations present. The muscles appear to stabilize the articulations and return them to a balanced position, similar to the way the intrinsic muscles of the spinal column are responsible for the articulations in that area. The usual treatment for the intrinsic muscles is origin/insertion technique, or neuromuscular spindle cell and Golgi tendon organ treatment.

There is no listing for neurolymphatic, neurovascular, organ-gland, meridian, or nutritional association for these muscles. They appear to respond to these specific approaches; however, the association is better found from larger muscles whose association has been established over a period of time in applied kinesiology.

In the normal foot, the intrinsic muscles do not appear to have an arch supporting role.[5] "The muscles are spared when the ligaments suffice."[3] Although the specific intrinsic muscles of the arch were not studied by Gray[8] in his comparison of the normal and the flat foot, it seems likely that they are active in the flat foot because of the lack of ligamentous support. In the presence of a chronic tarsal tunnel syndrome, there is clinically observed atrophy of the plantar intrinsic muscles. It is valuable to exercise these muscles after the tarsal tunnel syndrome has been corrected. In many cases, exercise improves function of the foot so that the patient may discontinue wearing orthopedic supports for the arches. (The many ramifications of the foot are discussed thoroughly in Volume IV of this series.)

Flexor Hallucis Brevis

Origin: Medial portion of the plantar surface of the cuboid bone, adjacent portion of the lateral cuneiform bone, and from prolongation of the tendon of the tibialis posterior.

Insertion: Medial and lateral sides of proximal phalanx of the great toe.

Action: Flexes metatarsophalangeal articulation of great toe.

Testing Position and Stabilization: Bringing the patient into the testing position for the flexor hallucis brevis is best done in three steps. First, plantar flex the 2nd, 3rd, and 4th digits to keep them out of the test. Second, fully dorsiflex the 1st and 2nd phalangeal articulations of the great toe to help take out the action of the flexor hallucis longus. Third, keeping the interphalangeal articulation in complete dorsiflexion, plantar flex the metatarsophalangeal articulation into testing position. While holding this position, the examiner stabilizes the foot, maintaining a neutral position between dorsiflexion and plantar flexion of the ankle.

Synergist: Flexor hallucis longus

Test: While maintaining hyperextension of the interphalangeal articulation, the examiner directs pressure against the plantar surface of the proximal phalanx toward extension.

Body Language of Weakness:

Movement aberrations: When the patient attempts to flex the great toe and there is weakness of the flexor hallucis brevis but strength of the flexor hallucis longus, the proximal phalanx will probably hyperextend and the distal phalanx will flex.

Postural imbalances: When the foot is relaxed, the toe will probably be in a hammer-toe position because of failure of the flexor hallucis brevis — which inserts on the proximal phalanx — to hold that phalanx toward flexion.

Nerve Supply: Tibial, L4, **5, S1,** 2

Neurolymphatic:

Anterior: inferior to the symphysis pubis at the height of the obturator (same as peroneus longus and brevis).

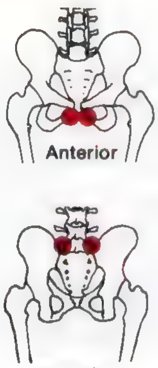
Posterior: between PSIS and L5 spinous.

Neurovascular: Bilateral frontal bone eminences

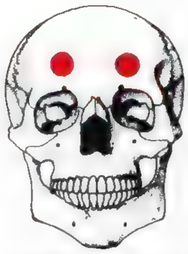
Nutritional: Raw bone concentrate correlating to tarsal tunnel syndrome or other subluxations of the foot.

Meridian Association: Circulation sex

General Discussion: The flexor hallucis brevis will usually be weak in the presence of a tarsal tunnel syndrome, while the flexor hallucis longus will usually (but not always) be strong. This is because the brevis receives its nerve supply distal to the tarsal tunnel, and the longus receives its nerve supply prior to the tarsal tunnel.



NEUROLYMPHATIC



NEUROVASCULAR

17—27.

17—28. *First step — flex 2nd-5th toes.*

17—29. *Second step — extend great toe and hold extension of interphalangeal articulation.*

17—30. *Third step — flex great toe between the metatarsophalangeal articulation to come to beginning of testing position.*

Abductor Hallucis

Origin: Medial process of the calcaneus, flexor retinaculum, plantar aponeurosis, and intermuscular septum.

Insertion: With the medial tendon of the flexor hallucis brevis into the medial side of the base of the proximal phalanx of the great toe.

Action: Abducts the great toe (from median line of the foot).

Testing Position: The patient abducts the toe. This is best accomplished by asking the patient to spread his toes like a fan. It is often found that a patient cannot abduct the toe into the testing position.

Stabilization: The examiner stabilizes the foot at the heel and lateral aspect, and does not grasp the foot over the abductor hallucis.

Test: Pressure is directed to the medial aspect of the great toe in a direction of adduction. During the test, the examiner continues to observe visually — and possibly with palpation — for activity of the muscle belly. Since the muscle is often congenitally inserted to be incapable of true abduction, this portion of the test helps delineate whether hallux valgus is due to muscle weakness, or lack of the muscle's ability to abduct the great toe.

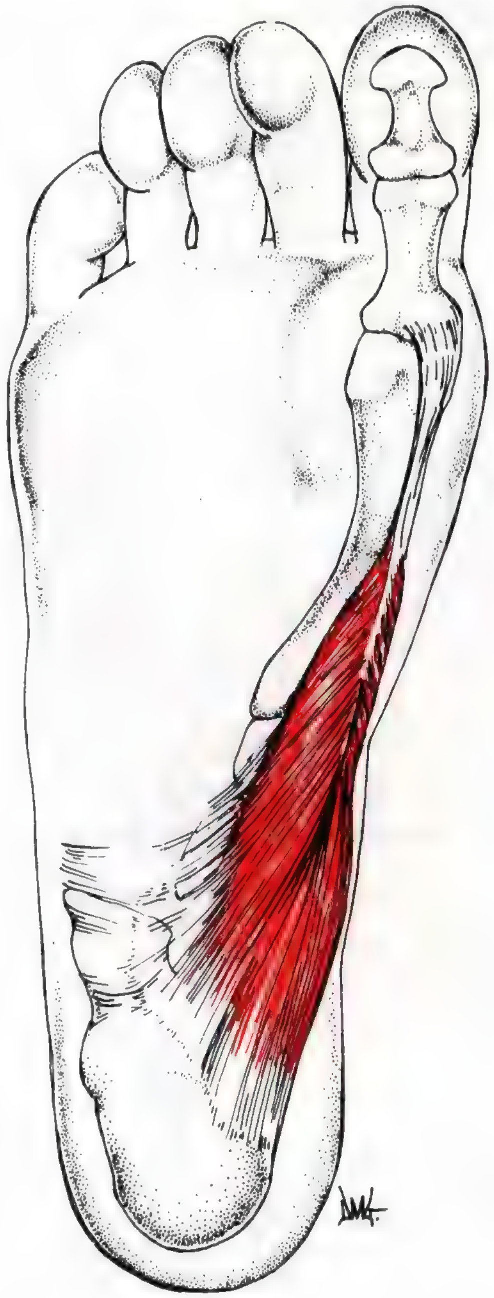
Body Language of Weakness:

Testing position: Patient is unable to abduct the great toe into the testing position. This inability has to be evaluated carefully by the examiner because many individuals cannot isolate the muscle activity. Palpation for the presence of the muscle and its ability to contract is often necessary.

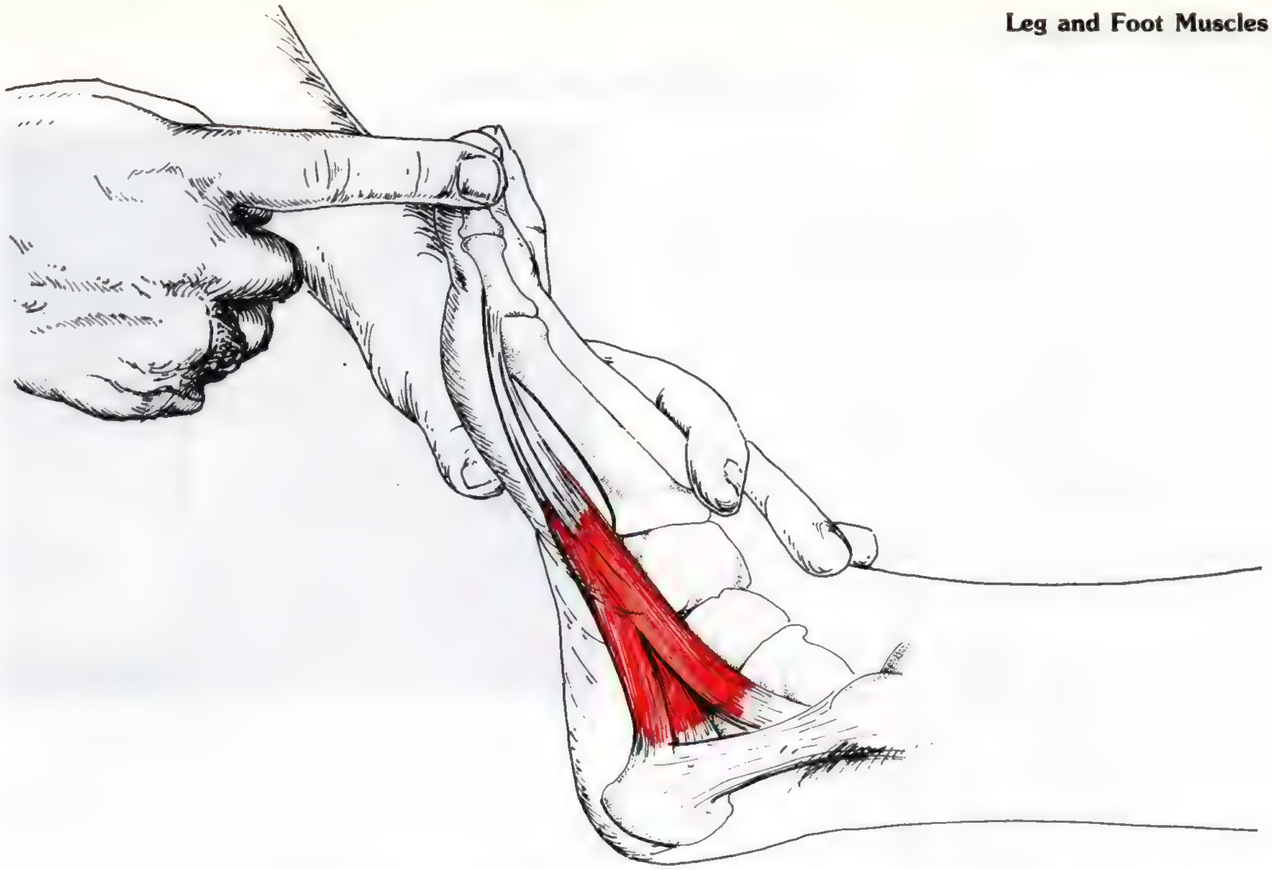
Postural imbalance: Hallux valgus position, and evidence in the general foot of a tarsal tunnel syndrome.

General Discussion: The evaluation of the abductor hallucis is difficult until the examiner has evaluated this muscle in many individuals, both normal and abnormal. The examiner tends not to test this muscle unless there is body language of its weakness or absence. It is necessary to test normal individuals to learn palpation of the muscle belly, and how to motivate individuals to abduct the great toe into the testing position.

In a morphological study, Kerr and Basmajian[2] studied 22 adult feet by dissection, with emphasis on the insertion of the abductor hallucis to determine its ability in abduction. They concluded that the muscle is so attached as to be capable of true abduction in only 20%. The greatest indication was that the muscle would flex the great toe. When the applied kinesiology examiner is evaluating the abductor hallucis in conditions of hallux valgus, it is necessary to palpate the belly of the muscle to determine if correction is taking place and to observe the motion of the great toe. Obviously, efforts to balance the abductor and adductor hallucis and flexor hallucis brevis will not improve hallux valgus if the abductor hallucis is inserted in such a way that it cannot abduct the great toe.



17—31.



17—32. *Palpation of the abductor hallucis is a common requirement to determine its activity.*

17—33.

Flexor Digitorum Brevis

Origin: Medial process of the calcaneus, central part of the plantar aponeurosis, and the intermuscular septa between it and the adjacent muscles. The entire muscle belly is firmly united with the plantar aponeurosis.

Insertion: Four tendons into the middle phalanges of the 2nd-5th toes.

Action: Flexes the middle phalanges on the proximal; continued action flexes the proximal phalanges on the metatarsals.

Testing Position: Patient flexes 2nd-5th toes, with emphasis toward the proximal middle phalanx articulation.

Stabilization: Examiner stabilizes across the top of the metatarsals with the foot and ankle in a neutral position.

Synergist: Flexor digitorum longus

Test: Examiner contacts all four toes on the plantar surface, and directs pressure toward extension.

Body Language of Weakness:

During test: Effort to flex toes into testing position pulls distal phalanx into flexion, but does not efficiently flex metatarsophalangeal articulations.

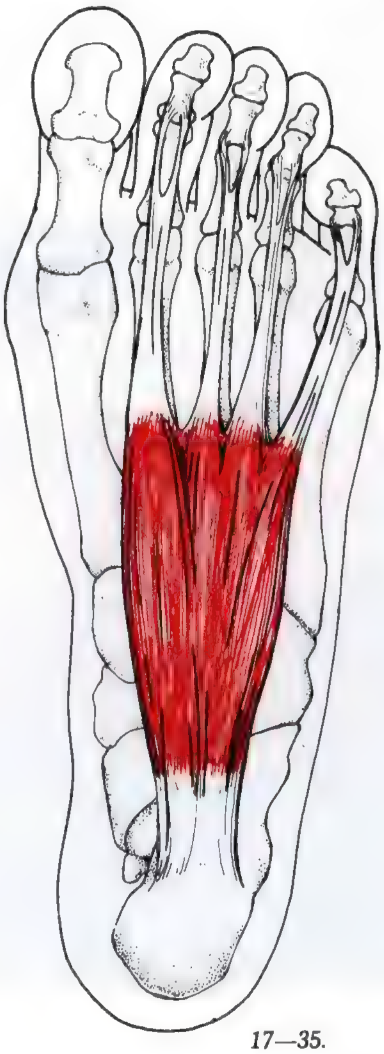
Movement aberrations: As the patient walks or stands, the distal phalanx will point down toward the floor and anterior sway will cause the distal phalanx to dig into the floor. The middle phalanx will rise.

Postural imbalance: The toes will be in a "hammer toe" position in which the metatarsophalangeal articulation will be in extension while the interphalangeal articulations are in flexion. There will be weight-bearing evidence on the tips of the toes, and failure of the entire toe to extend into a neutral position.

Nerve Supply: Medial plantar, L4, **5**, S1

General Discussion: The tendon to the 5th digit is congenitally absent in 23% of the cases.[7] This muscle frequently requires treatment to the neuromuscular spindle cell, Golgi tendon organ, or origin/insertion technique. Attempts to exercise this muscle are clinically ineffective if there is a tarsal tunnel syndrome present. Atrophy of the muscle indicates the probability of a tarsal tunnel syndrome.

17—34. Test flexion between proximal and middle phalanges.



17—35.

Lumbricales

Origin: Between the tendons of the flexor digitorum longus, except the first, which arises from the medial side of the first tendon of the flexor digitorum longus.

Insertion: On the medial side of the proximal phalanx, into the expansions of the tendons of the extensor digitorum longus of the 2nd-5th toes.

Action: Flex the proximal phalanges on the metatarsals, and extend the two distal phalanges of the four small toes.

Synergists: Flexor digitorum brevis and longus for the metatarsophalangeal articulation, and extensor digitorum longus and brevis for the extensor function; dorsal interossei and plantar interossei.

Testing Position: There are two tests for the lumbricales. Described here is the flexing action of the metatarsophalangeal articulation. The extension of the middle and distal phalangeal articulations is tested with the extensor digitorum longus and brevis.

Testing position for flexion of the metatarsophalangeal articulation is difficult to obtain in most individuals. The optimum testing position is flexion of the metatarsophalangeal articulation, with neutral position of the middle and distal interphalangeal articulations.

Stabilization: The examiner stabilizes across the dorsal surface of the metatarsals.

Test: Examiner contacts plantar surface of the proximal phalanges of the 2nd-5th toes, and directs pressure toward extension of the metatarsophalangeal articulations.

Body Language of Weakness:

Testing position: The patient has difficulty in actively achieving the testing position. When a patient cannot move into the testing position, the examiner can passively place the toes into the position to determine if the patient can hold it. Care must be taken, because many individuals cannot isolate muscle activity well enough to obtain or maintain the testing position, even though the muscle is not weak; only control is lacking.

Movement aberrations: Similar to those described for flexor digitorum brevis.

Nerve Supply:

1st lumbricalis: medial plantar nerve, L4, 5

2nd, 3rd, 4th lumbricales: lateral plantar nerve, S1, 2.

General Discussion: The lumbricales and interossei muscles are not often tested in applied kinesiology. Knowledge of the action and location of the muscles

17—36.

Lumbricales (continued)

is important for application of direct treatment to them in the case of subluxations, especially if they are recurrent.

The location of the lumbricales and interossei muscles indicates they may be important in the gait mechanism. The acupuncture points which are treated with gait dysfunction in AK are in the location of these muscles. It is clinically observed that when there is a gait dysfunction, there is exquisite tenderness on digital pressure in the area indicated for gait treatment. It seems likely that the muscle in the location of the apparently dysfunctioning acupuncture point is involved in some manner with the problem. Failure to correct any muscle involvement or subluxations seems to cause the active acupuncture point to return after it has apparently been effectively treated.

17—37. Starting position for test of flexion of metatarsophalangeal articulations.

Dorsal Interossei

Origin: There are four dorsal interossei which arise by double pennate fibers from the bases and sides of the bodies of adjacent metatarsal bones.

Insertion: Base of the proximal phalanx and aponeurosis of the tendons of the extensor digitorum longus. The 1st dorsal interosseous (arising from 1st and 2nd metatarsals) inserts into the 2nd toe. The 2nd-4th dorsal interossei insert into the lateral sides of the 2nd, 3rd, and 4th toes.

Action: Assist in flexing the proximal phalanx and extending the middle and distal phalanges. Abduct the toes from the longitudinal axis of the 2nd toe.

Nerve Supply: Lateral plantar

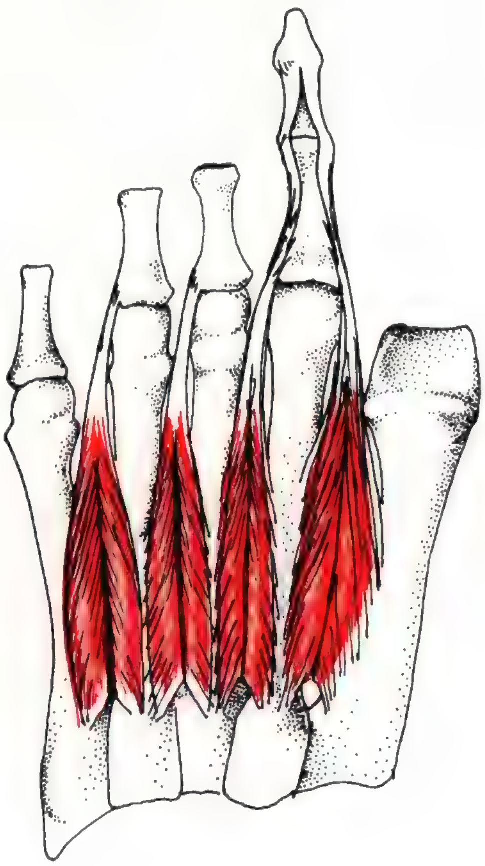
Plantar Interossei

Origin: There are three plantar interossei arising from the base and medial plantar surface of the 3rd, 4th, and 5th metatarsal bones.

Insertion: Medial side of the base of the 1st phalanx of the same toe, and into the tendons of the extensor digitorum longus.

Action: Flex the proximal and extend the distal phalanges, and adduct toes toward the axis of 2nd toe.

Nerve Supply: Lateral plantar



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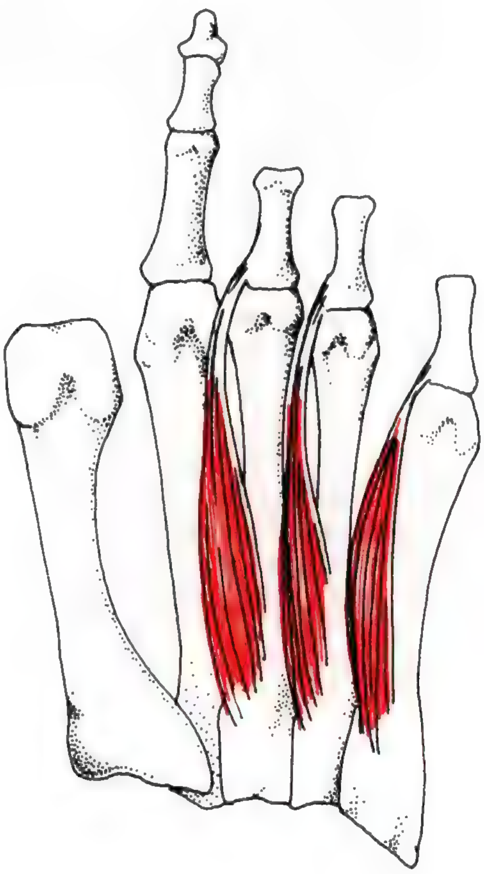

17—39.

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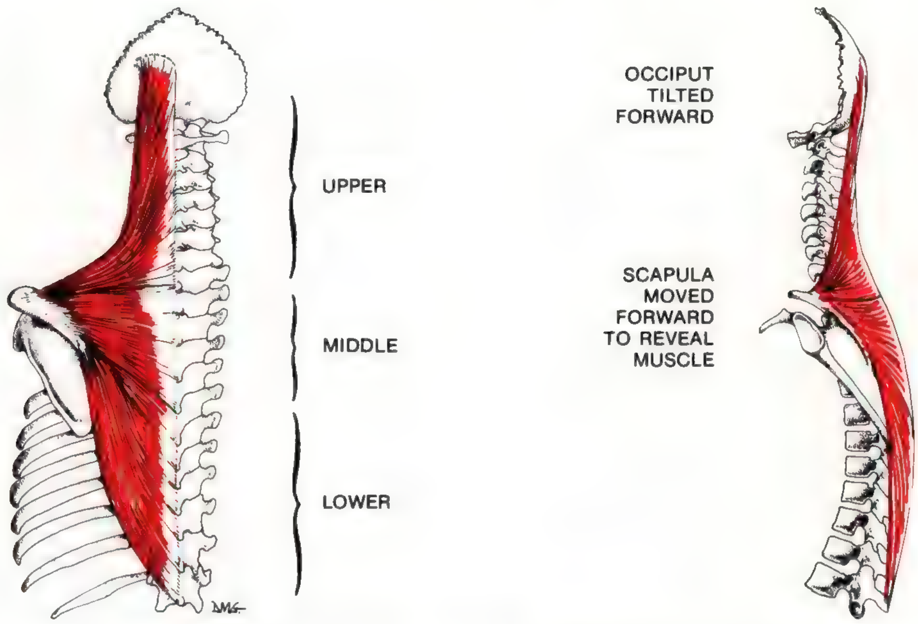
Chapter 18

Shoulder Muscles

Trapezius



18—1. Upper, middle, and lower divisions of trapezius.

Trapezius — Upper Division

Origin: External occipital protuberance, medial l/3 of superior nuchal line, ligamentum nuchae and spinous process of C7 vertebra.

Insertion: Lateral 1/3 of clavicle and acromion process.

Action: Rotation of scapula so glenoid cavity faces superior; adducts the scapula when acting with the other sections of the trapezius.

Reversed Origin-Insertion and Change of Action: Laterally flexes neck and head, rotates neck and head away from side contracting. When acting bilaterally, the upper trapezius is generally considered as a neck and head extender. Electromyography has demonstrated little participation of these muscles in this action when the prone subject lifts the head from the table. There is more activity when the motion is attempted against resistance.[24]

Testing Position: Seated patient elevates shoulder and laterally flexes neck and head, with rotation of head slightly away from the side being tested. The patient should not be allowed to bring the ear and shoulder into such close approximation that the upper trapezius is in a shortened, locked position.

Stabilization: Design of the test makes the testing pressure the stabilization.

Synergists: Levator scapula, clavicular head of the sternocleidomastoid.

Test: Examiner places one hand on the shoulder and the other on the head, directing force to reduce the approximation of the head and shoulder.

Body Language of Weakness:

Testing position: The patient will attempt to get ahead of the test by approximating the ear and shoulder close together, bringing the muscle into short phase of contraction where it has additional strength.

During test: Rotation of head and neck to change test parameter.

Movement aberrations: When the patient gets up from the prone position, his face will rotate away from the side of weakness, using the stronger upper trapezius more effectively to hold the head and neck. In arm abduction, there will be poor elevation of the lateral aspect of the scapula in effectively rotating the glenoid fossa superior.

Postural imbalance: High occiput and low shoulder on side of weakness. The head will rotate slightly toward the side of weakness. When this postural imbalance is present, it is sometimes mistakenly evaluated as a weak latissimus dorsi on the opposite side.

Alternate Testing Methods: Can be tested in the prone position by rotating head and neck toward side being tested. Examiner's force is applied to the posterolateral head in an anterolateral direction aligned with the fibers of the upper trapezius.

Nerve Supply: Spinal accessory and ventral ramus of C2, **3, 4**

Neurolymphatic:
Anterior: 3" of anterior upper arm.
Posterior: posterior arch of atlas to lateral mass.

Neurovascular: On temporal sphenoidal suture just above zygomatic arch.

Reactive Muscle Correlation: Latissimus dorsi, biceps brachii, opposite upper trapezius

Nutritional: Vitamins A, B, F, G, and calcium

Meridian Association: Kidney

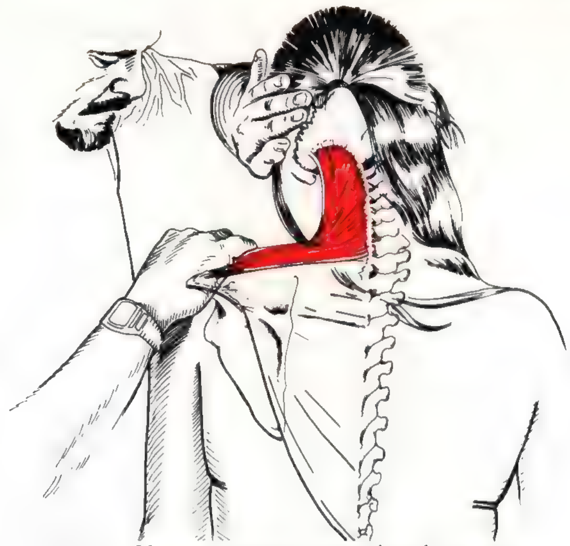
Organ Association: Eye and ear

General Discussion: The upper trapezius participates actively in arm abduction. It is responsible for elevating the lateral aspect of the scapula to face the glenoid cavity superior. Synergistic in this activity are the middle and lower portions of the trapezius. The lower division brings the medial border of the scapula inferior, while the middle division has a stabilizing effect.[16, 23]

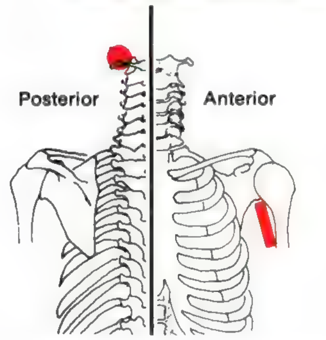
In many subjects, low grade postural activity occurs in the upper fibers of the trapezius in supporting the shoulder girdle. Activity of the upper fibers of the trapezius is not necessary in the support of the shoulder girdle. Bearn[4] demonstrated that all individuals could relax the upper trapezius to the point of no activity while in the upright position. With a ten-pound load held in the hand, 75% of the subjects were able to relax the trapezius immediately, or within two minutes. When a 25-pound load was held, 33% of the subjects could completely relax the upper trapezius. Fernandez-Ballesteros et al.[9] demonstrated activity in the upper trapezius during both phases of the step, but the activity ceased as soon as the subject stopped walking and stood at ease.

The upper trapezius has been observed on a clinical basis to be involved with certain types of eye and hearing problems. The correlation seems to be primarily with neurolymphatic — and sometimes neurovascular — activity. It is more difficult to obtain changes in a high range hearing loss than a low one. The upper trapezius can be involved with certain types of strabismus.

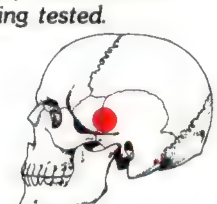
Imbalance of the upper trapezius may be associated with a shoulder outlet syndrome. The imbalance also seems to influence the tonic neck and labyrinthine reflexes, and the visual righting reflexes (discussed under the sternocleidomastoid muscle).



18—2. Upper trapezius test; head rotation slightly away from side being tested.

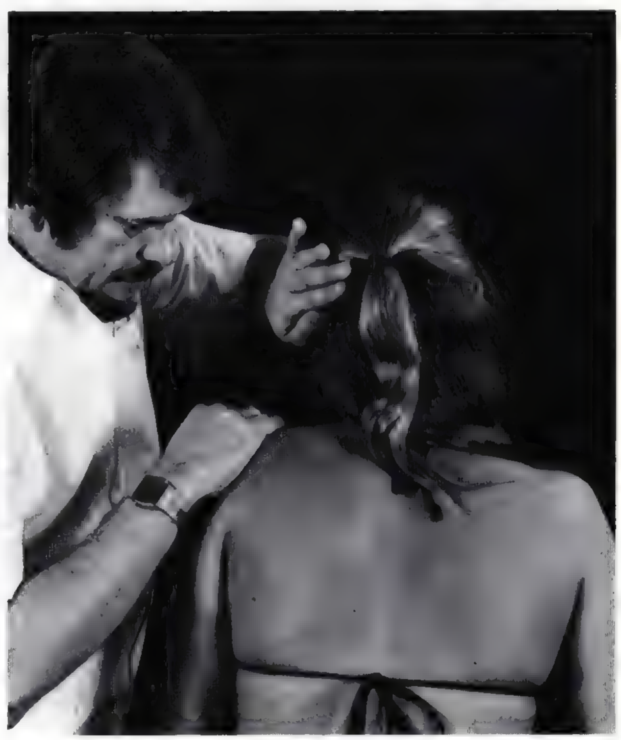


NEUROLYMPHATIC — BILATERAL



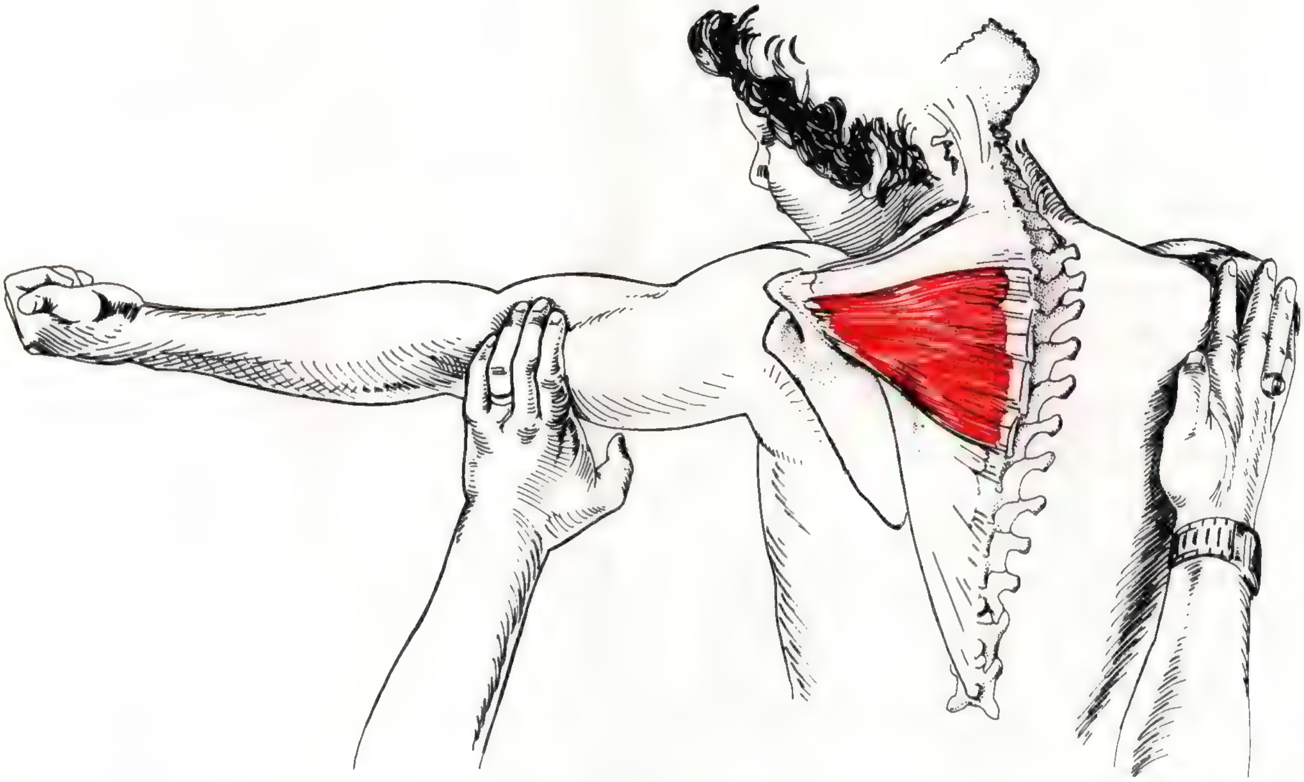
NEUROVASCULAR

STRESS RECEPTOR



18—3.

Trapezius — Middle Division



18—4. Middle trapezius test. Head turned toward side of test, or straight in face-piece of table. Arm in external rotation.

Origin: Spinous processes of 1st-5th thoracic vertebrae.

Insertion: Superior borders of spine of scapula.

Action: Adducts and slightly elevates scapula,[23] draws back acromion process.

Testing Position: Prone patient extends elbow with shoulder in 90° abduction and lateral rotation (thumb toward ceiling). The extreme position of lateral rotation of the arm is necessary to place the trapezius at its best advantage during this test.[18]

Patient Fixation Requirements: The arm is simply a lever to obtain scapular motion. The elbow must be held in extension, and the posterior shoulder muscles must be adequate to fix the glenohumeral articulation.

Stabilization: The examiner stabilizes the opposite shoulder to avoid rotation about the vertical axis.

Synergists: Rhomboids. The rhomboids have best advantage when the arm is held in medial rotation. They are at a disadvantage with external rotation.[18] Also synergistic are the upper and lower divisions of the trapezius and the levator scapula.

Test: Examiner directs force against the arm toward the floor. Observation should be made for strong glenohumeral fixation. The test is of abduction of the scapula from the spine and must be observed or palpated by the examiner. Many examiners fail to observe for the abduction of the scapula, and list the mid-trapezius as weak simply because the arm fails to resist the testing pressure. The failure may be due to inadequate glenohumeral fixation.

Body Language of Weakness:

Testing position: Inability to hold position without scapular abduction. If the rhomboids are overactive as synergists, there will be more superior movement of the scapula.

During test: Superior movement of the scapula indicating excessive rhomboid effort in the test, which may also indicate effort of the levator scapula and upper trapezius. Effort of the lower trapezius inferiorly displaces the scapula.

Postural imbalances: Abduction of the scapula, some tendency toward flaring of the vertebral border of the scapula.

Nerve Supply: Spinal accessory and ventral ramus, C2, **3, 4**

Neurolymphatic:

Anterior: 7th intercostal space on the left.

Posterior: Between T7-8 near laminae on left.

Neurovascular: 1" above lambda

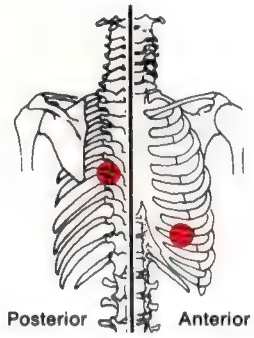
Nutritional: Spleen concentrate or nucleoprotein extract, vitamin C, calcium.

Meridian Association: Spleen

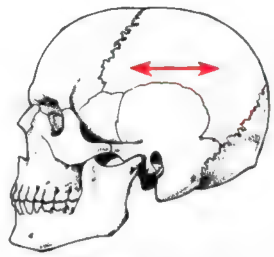
Organ-Gland Association: Spleen

General Discussion: The upper portion of the middle division of the trapezius is active in retraction of the scapula; it is the most active of the divisions when straight elevation of the scapula is attempted.[23] The middle division of the trapezius does not appear to be as important in shoulder flexion and abduction as the others. In the early stage of forward flexion of the shoulder, the middle fibers of the trapezius, along with those of the rhomboid muscles, must relax to allow forward sliding of the scapula.[2] They become more active in the motion for stabilization after the initial movement of the scapula away from the spine.

NEUROVASCULAR



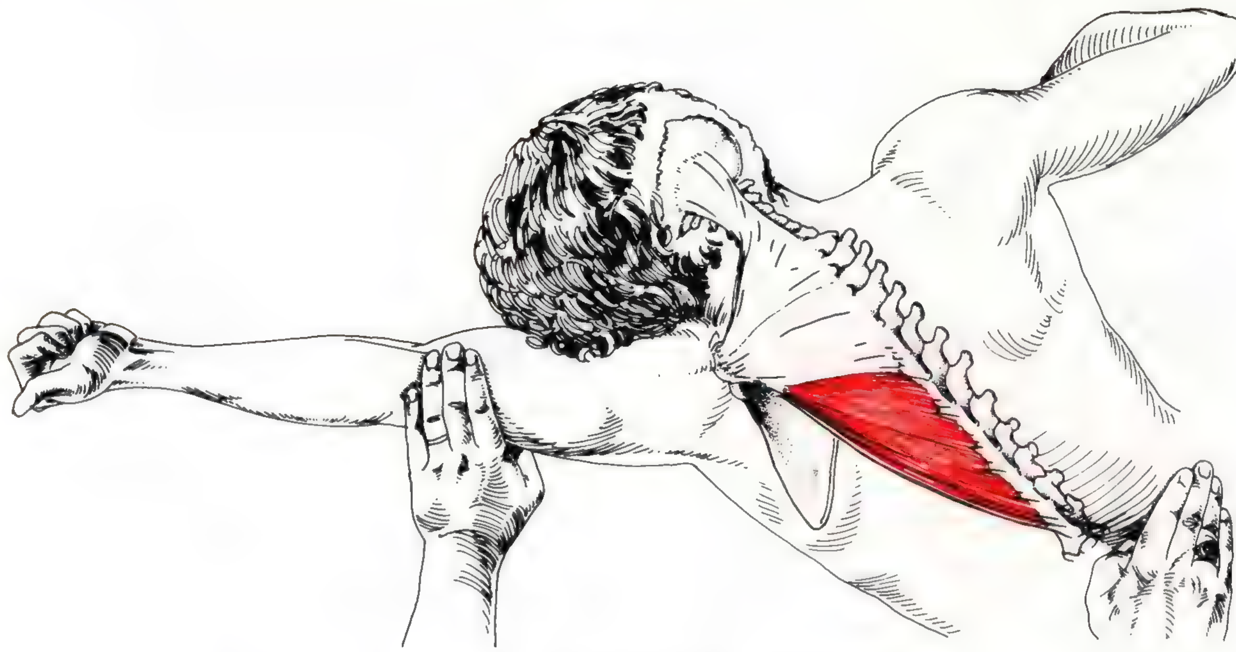
NEUROLYMPHATIC REFLEX USUALLY ON LEFT ONLY



STRESS RECEPTOR

18—5.

Trapezius — Lower Division



18—6. Lower trapezius test, head turned toward side of test or straight in face-piece of examination table. Arm in external rotation.

Origin: Spinous processes, 6th-12th thoracic vertebrae.

Insertion: Medial 1/3 of spine of the scapula.

Action: Rotation of scapula. Gives inferior stabilization of scapula. Helps maintain spine in extension; draws back acromion process.

Testing Position: Prone patient places elbow in extension, arm in lateral rotation (thumb toward ceiling)[18] and diagonally overhead to align with the central fibers of the lower trapezius. The humerus is abducted to approximately 150°, depending upon the patient's body type.

Patient Fixation Requirements: The arm is used only as a lever to exert force on the scapula. The glenohumeral articulation must be fixed by the posterior shoulder muscles, and the elbow held in extension.

Stabilization: Stabilization is primarily provided by the patient's weight. Mild stabilization is provided by the examiner to prevent rotation around the vertical axis.

Test: Pressure is directed against the arm toward the floor. The point of contact varies, depending upon the amount of leverage the examiner desires. There should be no motion at the glenohumeral articulation and the elbow should not flex. The test is abduction and elevation of the scapula from the spine, and must be observed or palpated by the examiner.

Body Language of Weakness:

- **Testing position:** Patient is unable to hold the arm in the testing position.
- **During test:** Patient attempts to rotate shoulder, flex elbow, or lift shoulder from table.
- **Movement aberrations:** Lower trapezius is active in rotating the glenoid cavity superior in arm abduction. When evaluating the patient's ability to rotate the glenoid cavity superior, ability to depress the medial aspect of the scapula will be limited. It will be difficult to bring the shoulders back and down in a military-type posture.
- **Postural imbalances:** Abduction and elevation of the scapula, with probable secondary shortening of the pectoralis minor. Thoracic spine kyphosis.

Nerve Supply: Spinal accessory and ventral ramus, C2, **3**, **4**

Neurolymphatic:

- **Anterior:** 7th intercostal space on left.
- **Posterior:** Between T7-8 near laminae on left.

Neurovascular: 1" above lambda

Nutritional: Spleen concentrate or nucleoprotein extract, vitamin C, calcium

Meridian Association: Spleen

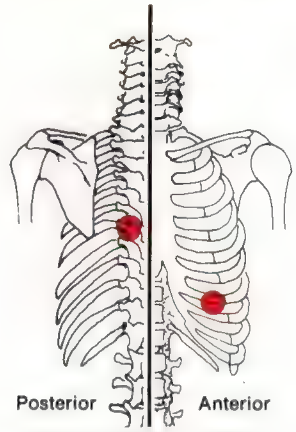
Gland Association: Spleen

General Discussion: Bilateral weakness of this division indicates probable functional spinal fixation at the dorsolumbar junction. Correction of the fixation will immediately restore normal strength to the bilaterally weak division.

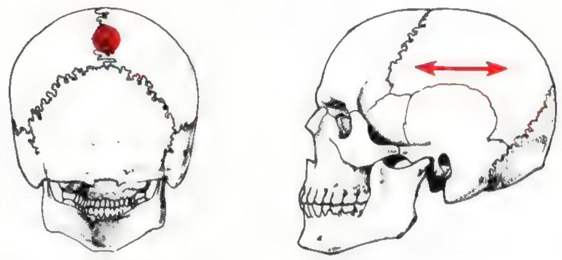
Weakness of the lower trapezius is a very common cause of hypertonicity or shortening of the pectoralis minor muscle. This involvement can cause a shoulder outlet syndrome as a result of the neurovascular bundle being compressed underneath the pectoralis minor.

A bilateral pectoralis major (clavicular division) weakness can be masked by the presence of bilateral lower trapezius weakness. This is because of the antagonistic function of these muscles. When the lower trapezius is weak, it allows contraction of the pectoralis major (clavicular division). Correction of the lower trapezius weakness reveals the hidden bilateral pectoralis major (clavicular division) weakness.

In arm abduction, the lower division of the trapezius is the most active in rotation of the scapula to face the glenoid cavity superior.[23]



NEUROLYMPHATIC REFLEX
USUALLY ON LEFT ONLY



NEUROVASCULAR

STRESS RECEPTOR

18—7.

Rhomboid Major and Minor

RHOMBOID MAJOR

Origin: Spinous processes of 2nd-5th thoracic vertebrae.

Insertion: Medial border of scapula from spine to inferior angle.

Action: Adducts scapula and slightly elevates medial border. The lower fibers of the rhomboid major aid in rotating the glenoid cavity inferior. In abduction of the arm, the rhomboids relax to allow scapula abduction, and then contract to stabilize the scapula during scapular rotation with continued abduction.

RHOMBOID MINOR

Origin: Ligamentum nuchae, spinous processes of C7 and T1.

Insertion: Medial border of scapula at root of spine of scapula.

Action: Adducts and slightly elevates scapula.

Testing Position for Rhomboid Major and Minor: In the seated position, the patient adducts and elevates the scapula on the side to be tested.

Patient Fixation Requirements: The arm is used to direct a pulling force on the scapula in the direction of abduction and superior rotation of the glenoid cavity; consequently, the patient must be able to fix the shoulder articulation.

Synergists: Upper, middle, and lower trapezius; levator scapula, and latissimus dorsi.

Antagonist: Serratus anticus

Test: Examiner contacts medial elbow and directs force to abduct elbow from the body. Observation is made for abduction of the scapula from the spine, which indicates rhomboid weakness.

Body Language of Weakness:

Testing position: When the patient places the scapula in the testing position, the examiner should observe for the slight elevation which the rhomboids impart to the movement. Lack of this elevation indicates the middle trapezius is adducting the scapula. If the upper trapezius is primarily involved in the adduction process, the lateral portion of the scapula will be primarily elevated. Combined elevation and adduction by the levator scapula and the upper trapezius give minimum adduction compared to rhomboid activity.

During test: The examiner must observe for abduction of the scapula. Failure of the patient to hold the arm in adduction does not indicate rhomboid weakness unless the scapula moves away from the spinal column.

Postural imbalances: Unilateral rhomboid weakness allows scapula to abduct from the spine and drop inferior. The head will rotate toward the side of weakness because of lack of spinal stabilization in rotation.

Alternate Testing Methods: Test can be done prone or standing in a manner similar to the seated test. A test designed by Goodheart[11] is said to avoid recruitment of the opposite rhomboid. The supine patient rolls onto the scapula on the side opposite the rhomboids being tested. This position seems to immobilize the opposite rhomboids and scapula. The test is done in a manner similar to the sitting test. The examiner must watch carefully for scapular abduction and inferior displacement.

Nerve Supply:
Rhomboid major: dorsal scapular, C4, 5
Rhomboid minor: dorsal scapular, **C4, 5**

Neurolymphatic:
Anterior: 6th intercostal space from mammillary line to sternum on left.
Posterior: Between T6-7 by laminae on left.

Neurovascular: Bilateral frontal bone eminences.

Reactive Muscle Correlation: Deltoid, serratus anticus, supraspinatus

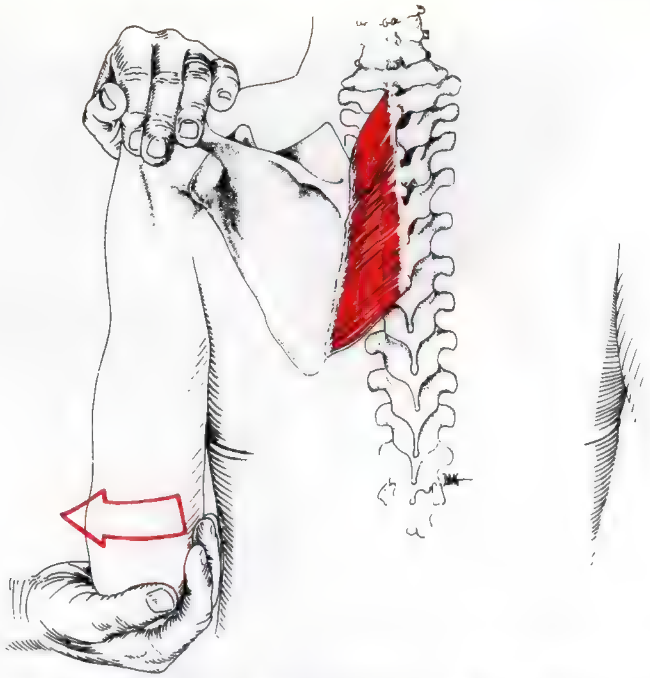
Nutritional: Vitamin A

Meridian Association: Liver

Organ Association: Liver

18—8. Starting position.

General Discussion: There has been some controversy in applied kinesiology regarding the muscle-organ association of the rhomboid muscles. Goodheart[10] correlates them to the liver and to the liver meridian; he has also associated them with the stomach.[14] It appears that the rhomboid muscles respond to the neurolymphatic and neurovascular reflexes of both the stomach and the liver. This is possibly because of the close proximity of the neurovascular reflexes. There is also an occasional influence of the right neurolymphatic reflex, associated with the liver, on the right pectoralis major (clavicular division) associated with the stomach. This change of influence is repeated by the left neurolymphatic reflex, associated with the stomach, influencing the pectoralis major (sternal division) associated with the liver. There seems to be some interplay between these reflexes, muscles, and organs.



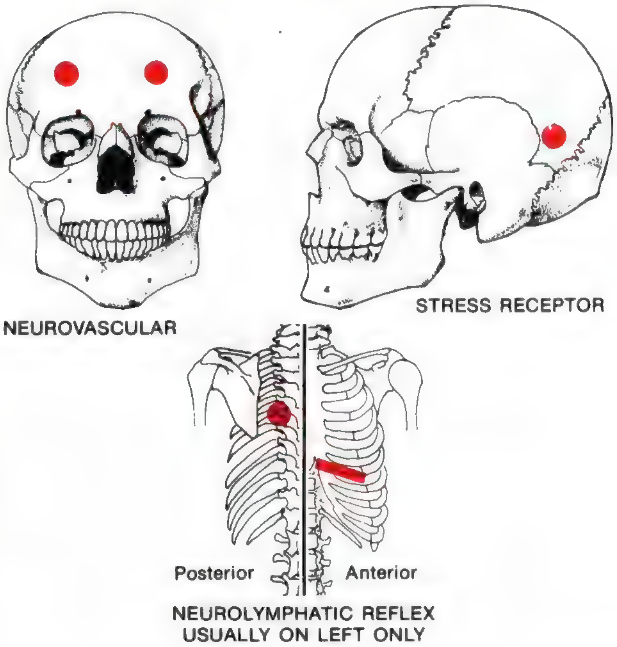
18—10. Rhomboid muscle test. Examiner must observe for scapular movement away from spine in the direction of the arrow.

The rhomboids often appear to be hypertonic or shortened. This is usually associated with a weak serratus anticus, which is antagonistic to the rhomboids. Efforts to relax the rhomboids will usually be non-productive until the serratus anticus has been strengthened. This pattern is generally observed from patient complaints of tension and aching "between the shoulder blades." There will often be thoracic spine fixations in the same area.

The rhomboids and serratus anticus are antagonistic in scapular movement on the thoracic cage; however, they are synergistic in their efforts to hold the vertebral border to the thoracic cage.[19]

As observed on electromyography, the rhomboids are inactive in the first phase of shoulder abduction. This allows the scapula to abduct away from the spine.[2] If the rhomboids are hypertonic or shortened, this first abduction of the scapula during arm abduction is limited.

18—9. Movement of scapula in presence of weakness.



Levator Scapula

18—11. Levator scapula test requires examiner to observe for scapular rotation.

Origin: Transverse processes of upper four cervical vertebrae.

Insertion: Vertebral border of scapula between superior angle and root of spine.

Action: Raises scapula to inferiorly rotate glenoid cavity. Working in combination with the upper trapezius, elevates and adducts scapula.

Reversed Origin-Insertion and Change of Action: When scapula is fixed laterally, flexes and slightly rotates cervical spine.

Testing Position: Seated patient flexes elbow and totally flexes spine to reach inferior with the elbow to the posterolateral crest of the ilium. The humerus is in adduction and slight extension. The patient then superiorly elevates and adducts the superior vertebral border of the scapula. The rhomboids, especially the rhomboid major, are put at a disadvantage in this position.

Patient Fixation Requirements: The patient must have an intact shoulder with normal strength of the shoulder muscles because the arm is used as a lever to impart rotational movement to the scapula.

Stabilization: The patient's body weight aids in stabilization. The examiner stabilizes at the shoulder to prevent lateral tilting of the patient.

Synergists: Rhomboids and trapezius

Test: The examiner directs force against the medial elbow in a direction of abduction, observing for inferior rotation of the superior angle of the scapula.

Body Language of Weakness:

Testing position: The patient cannot bring the scapula into a superior adducted position without the entire vertebral border of the scapula adducting and moving superior. The examiner

should observe for superior elevation of the lateral aspect of the spine of the scapula, which is accomplished by the upper trapezius.

During test: Superior movement of lateral aspect of the scapula with no superior movement of the medial border. The examiner should make certain there is adequate fixation of the shoulder.

Movement aberrations: When the scapula is elevated in the presence of a weak levator scapula, there is more lateral elevation because of upper trapezius contraction.

Postural imbalance: Inferior position of the vertebral border of the scapula, with greater abduction of the inferior angle.

Nerve Supply: Dorsal scapula, **C3, 4, 5**

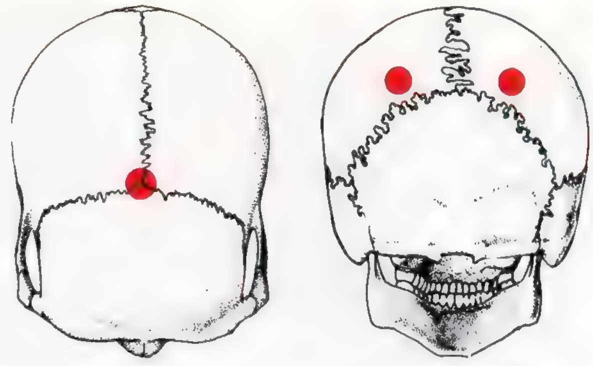
Neurolymphatic:
Anterior: 1st rib intercostal space near sternum
Posterior: Belly of teres minor

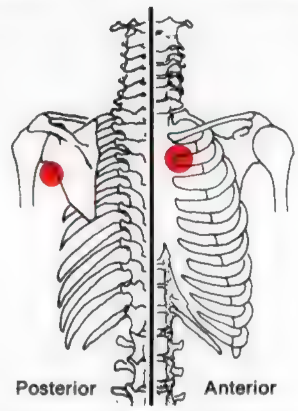
Neurovascular: Bregma

Nutritional: Parathyroid concentrate or nucleoprotein extract

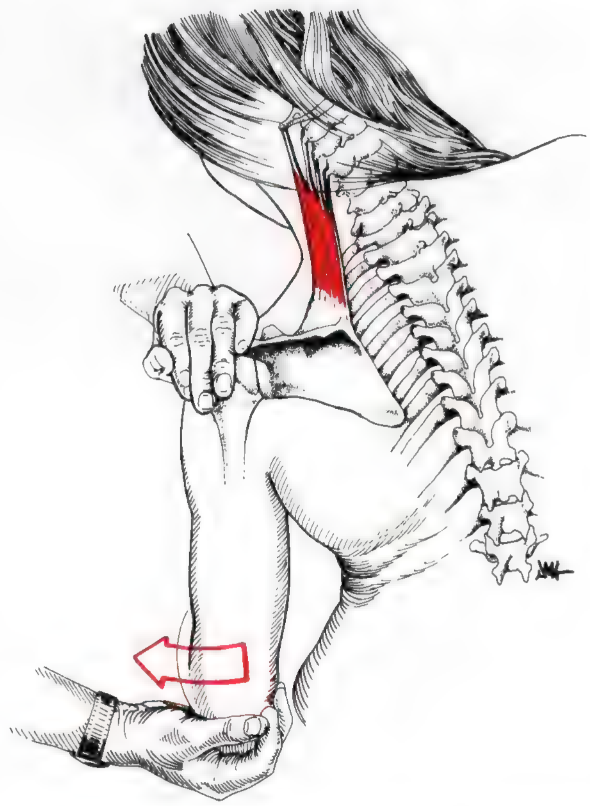
Meridian Association: Lung

Gland Association: Parathyroid glands





General Discussion: There is often a dysfunction of the cervical spine in the presence of imbalanced levator scapula muscles. The spinal problem manifests itself as a type of fixation which does not allow adequate rotation of the cervical spine. This is observed by limited cervical rotation on the side opposite the levator scapula muscle weakness. Usually the first procedure is to strengthen the weak levator scapula muscle; in many instances this will return cervical spine rotation to normal. If not, the next approach is to evaluate the levator scapula on the opposite side for muscle stretch response or requirement for proprioceptive treatment. After correction of the short or hypertonic muscle, cervical spine rotation will nearly always be returned to normal; if not, a general "cervical break" type of adjustment is recommended by Goodheart.[10] Contact of the adjusting hand is on the side opposite the original weakness.



18—12. Levator scapula test requires examiner to observe for scapula rotation. Testing pressure is in direction of arrow.

Serratus Anticus

Origin: Outer surfaces and superior borders of upper 8 or 9 ribs.

Insertion: Costal surface of the vertebral border of scapula.

Action: Abducts scapula and rotates it to point the glenoid cavity more superior. Holds vertebral border of scapula to thoracic cage, along with rhomboids and middle trapezius.

Testing Position: The patient's arm is brought to approximately 100°-130° flexion with slight abduction. This brings the inferior angle of the scapula into abduction and the glenoid cavity into superior rotation.

Patient Fixation Requirements: The performance of this test requires an intact shoulder. The deltoid and supraspinatus must be strong, as the arm is being used only as a lever to impart force into the scapula, testing the capability of the serratus anticus to maintain the scapular rotation. The test information is invalid if there is shoulder pain from bursitis or other pathology.

Stabilization: Generally no stabilization is necessary; however, the examiner should be alert to the patient shifting the trunk or attempting to elevate the shoulder on the side of test.

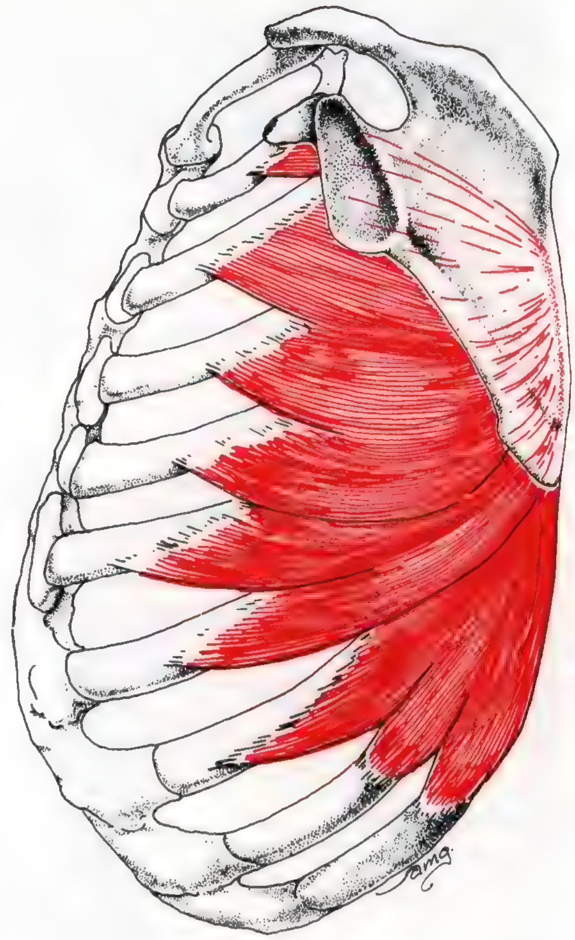
Test: Testing pressure is directed on the humerus or at the wrist, depending upon the amount of leverage the examiner wishes to use. The integrity of the glenohumeral articulation must be taken into consideration, making certain that no movement takes place at that joint. The examiner's other hand contacts the inferior lateral border of the scapula, rotating the inferior angle medially, while applying pressure to bring the arm downward in the direction of extension and adduction.

Body Language of Weakness:

Testing position: When the patient's arm is put in the testing position and released, the examiner should observe for scapular movement and flaring.

During test: The scapula rotates and lifts away from the thoracic cage. This test primarily evaluates the ability of the serratus anticus to impart rotation to the scapula and to help maintain the vertebral border of the scapula adjacent to the thoracic cage.

Movement aberrations: The patient has difficulty pushing with the arm held straight out in front. Holding weight out in front causes scapular "flare" or "winging."



18—13.

In abduction of the arm, the scapula is adducted when there is failure of the serratus anticus to help the trapezius in superiorly rotating the glenoid cavity. This is because the lower trapezius moves the vertebral border of the scapula inferiorly, while simultaneously pulling the scapula into adduction. Failure of the serratus anticus to counteract the adduction is postural language of its inactivity.

Postural imbalances: In the presence of a weak serratus anticus, the antagonistic rhomboids will contract because of lack of opposition. If the rhomboids contract, there will not be significant winging of the scapula because the rhomboids hold the vertebral border in as they elevate the scapula. Without secondary rhomboid contraction, the vertebral border of the scapula wings away from the thoracic cage. When functioning normally, the serratus anticus and rhomboids act synergistically to keep the scapula vertebral border adjacent to the thoracic cage, preventing winging of the scapula.[19]

18—14. Serratus anticus test requires examiner to observe for scapular movement.

Inman et al.[16] demonstrated with electromyography that the serratus anticus has differing activity at its various levels. When there is indication that direct treatment to the muscle is required, such as the muscle stretch response or the proprioceptive techniques of applied kinesiology, the exact level of muscle involvement must be determined.

Alternate Testing Methods: The standing patient, with arms outstretched, pushes against a wall. The serratus anticus must be intact to prevent flaring of the vertebral border of the scapula.

The ability of the serratus anticus to abduct the scapula can be evaluated in the supine patient. The arm is held in 90° flexion, and the scapula is abducted to the maximum amount for the starting position. The abduction will be assisted by the pectoralis minor, which brings the coracoid process anterior, medial, and inferior. The examiner directs pressure on the patient's outstretched arm directly toward the table. Observation is made of serratus anticus ability to stabilize the scapula in the abduction position. Additional pressure can be directed to the inferior lateral aspect of the scapula, thus more significantly testing the anterior serratus' capability of stabilizing the scapula. If the inferior angle of the scapula moves but the upper portion does not, the major activity of

Serratus Anticus (continued)

stabilizing the scapula is being done by the pectoralis minor. The test for rotation of the scapula, listed first, is the preferred test.

Nerve Supply: Long thoracic, **C5, 6, 7**

Neurolymphatic:
Anterior: 3rd, 4th, and 5th intercostal space near sternum.
Posterior: T3, 4, and 5 at laminae.

Neurovascular: Bregma

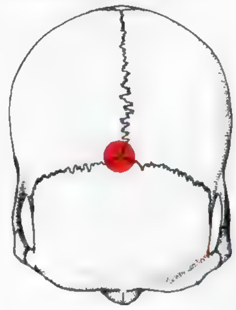
Reactive Muscle Correlation: Rhomboid, pectoralis minor.

Nutritional: Lung concentrate or nucleoprotein extract, vitamin C

Meridian Association: Lung

Organ Association: Lung

General Discussion: This muscle is extremely important in shoulder function and in the humeroscapular ratio of abduction. Weakness in the serratus anticus is often observed symptomatically by the secondary contraction of the unopposed rhomboids. Occasionally there will be bilateral weakness of the serratus anticus, which correlates with a cervical-thoracic fixation.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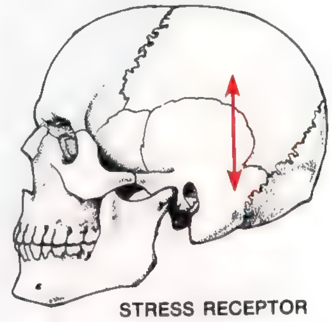
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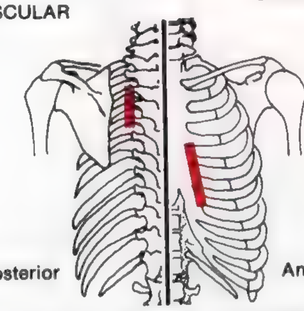


NEUROLYMPHATIC — BILATERAL


18—15.


18—16.

Latissimus Dorsi

Origin: A broad aponeurosis by which it originates from the lower 6 thoracic vertebrae spinous processes, lumbar spinous processes, posterior crest of the ilium, lower 3 or 4 ribs, and an attachment to the tip of the scapula.

Insertion: Twists upon itself to insert into the floor of the intertubercular groove of the humerus.

Action: Extends, adducts, and rotates the humerus medially; draws the inferior angle of the scapula inferior and medial.

Testing Position: Can be tested in a standing or seated position. Patient holds arm in adduction with medial rotation, so the antecubital fossa faces medial.

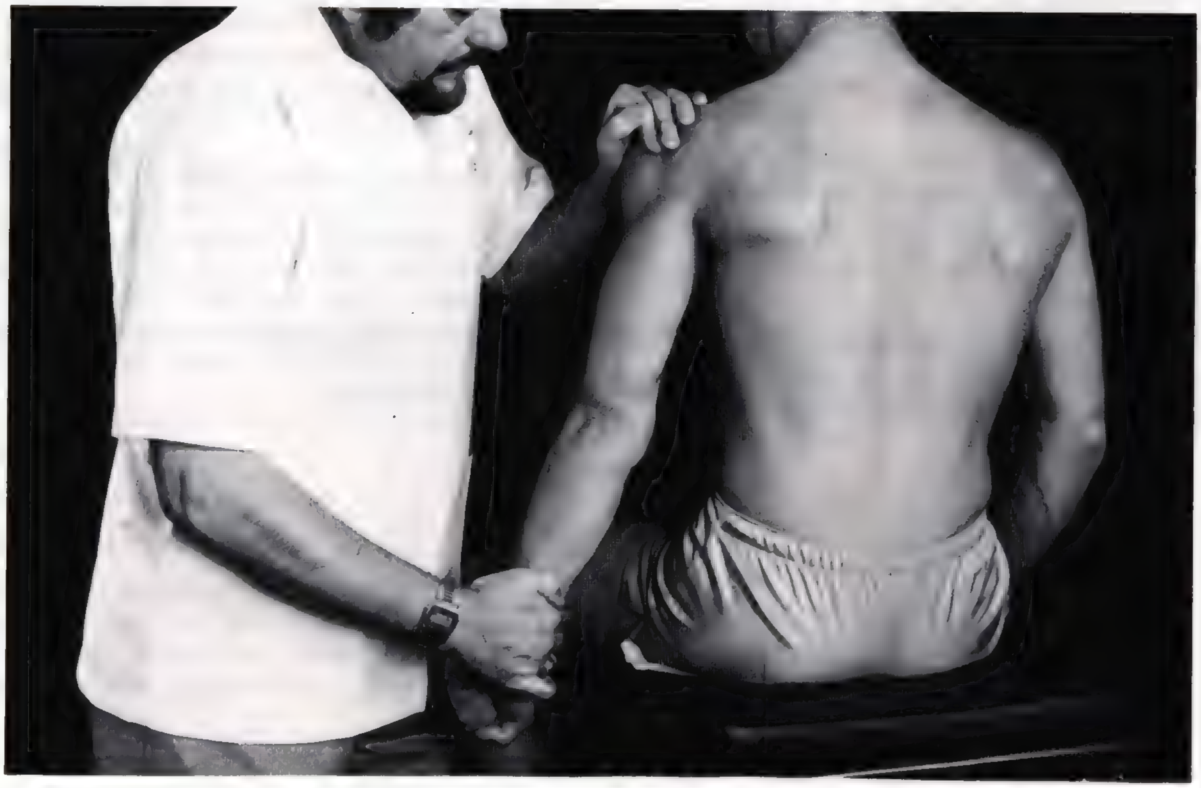
Patient Fixation Requirements: Elbow is maintained in extension.

Stabilization: The examiner stabilizes against the shoulder to prevent the patient from laterally flexing the trunk or elevating the shoulder.

Test: The examiner directs pressure to the patient's wrist in a direction to abduct and slightly flex the shoulder. Care should be taken that the pressure against the wrist does not cause pain to the patient. The examiner must avoid touching the meridian pulse points of the wrist which are located along the radial artery, accidentally causing therapy localization (see Volume III).

18—17. Latissimus dorsi muscle test. Space is present between examiner's palm and patient's wrist so as not to accidentally therapy localize the meridian pulse points.

Latissimus Dorsi (continued)



18—18. Elbow is maintained in extension by patient.

Body Language of Weakness:

During test: Patient attempts to flex elbow, raise shoulder, or tilt trunk away from side being tested.

Movement aberrations: Difficulty in accomplishing climbing-type actions with the arm, such as a chin-up exercise or climbing a ladder.

Postural imbalances: Elevated shoulder, with head level. The shoulder elevates but appears to shorten in its horizontal width because of the unopposed upper trapezius contraction. When upper trapezius contraction is due to weakness of the upper trapezius on the opposite side, there will be shoulder elevation and lateral head tilt on the contracted upper trapezius side.

Alternate Testing Method: Patient can be tested in a prone or supine position with the same basic procedures as used in a seated or standing position.

Nerve Supply: Thoracodorsal from brachial plexus, **C6, 7, 8**

Neurolymphatic:

Anterior: 7th intercostal space on left at rib-cartilage junction.

Posterior: Between T7-8 at lamina on left.

Note: Generally both latissimus dorsi muscles will be affected by the left neurolymphatic reflexes. Occasionally the neurolymphatic reflex may be on the right, influencing the right muscle; if so, evaluate the patient for switching, which may or may not be present.

Neurovascular: Superior to temporal bone on a line slightly posterior to the external auditory meatus.

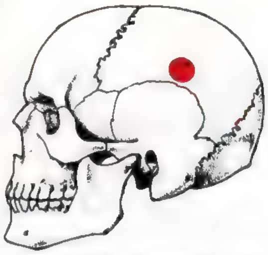
Reactive Muscle Correlation: Upper trapezius, contralateral hamstrings.

Nutritional: Vitamins A, F (unsaturated fatty acids), and betaine; pancreas concentrate or nucleoprotein extract.

Meridian Association: Spleen

Gland Association: Pancreas

18—19. Error in test when patient flexes elbow.



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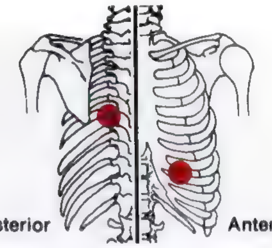


NEUROLYMPHATIC REFLEX
USUALLY ON LEFT ONLY

General Discussion: The latissimus dorsi may sometimes be involved with the "frozen shoulder" syndrome. The involvement usually relates to the muscle on the opposite side of the shoulder problem. Weakness of the contralateral latissimus dorsi appears to cause hypertonicity or shortening of the muscle on the side of involvement, restricting arm abduction. Correction is clinically observed by returning normal strength and function to the contralateral latissimus dorsi muscle. It may be necessary to use spray and stretch, fascial release, or proprioceptive technique on the latissimus dorsi on the side of involvement.

In applied kinesiology, it has been found clinically valuable to evaluate the latissimus dorsi in blood sugar handling problems and digestive disturbances. Evaluation of the latissimus dorsi in digestive disturbances has been overlooked by many in applied kinesiology. It seems to clinically give a good indication of the ability of the pancreas to produce digestive enzymes. Some in applied kinesiology have indicated that left latissimus dorsi weakness correlates more with insulin production by the Isles of Langerhans, and right latissimus dorsi weakness with enzyme production by the pancreas. Although this sometimes appears to have a correlation to this author, it does not seem to be a consistent one.

Effective function of the latissimus dorsi is important in various sports activities. An activity such as swimming can be disturbed by an imbalance of these muscles. The individual may have greater strength on one side, causing inability to swim straight at maximum speed and requiring continual direction correction.

There is controversy regarding the latissimus dorsi's activity in medial rotation. DeSousa et al.[8] deny its activity on medial rotation, while Broome and Basmajian[6] found it active in most cases. Regardless of its activity in medial rotation, the medially rotated position for testing the latissimus dorsi seems to be the most reliable because of the alignment of the origin and insertion of the muscle. This position, however, allows the patient to be in a position to flex the elbow, giving additional synergistic activity to the latissimus dorsi in maintaining adduction of the arm. Allowing the patient to flex his elbow is the most common error in evaluating this muscle by manual muscle testing.

Pectoralis Major (Clavicular Division)

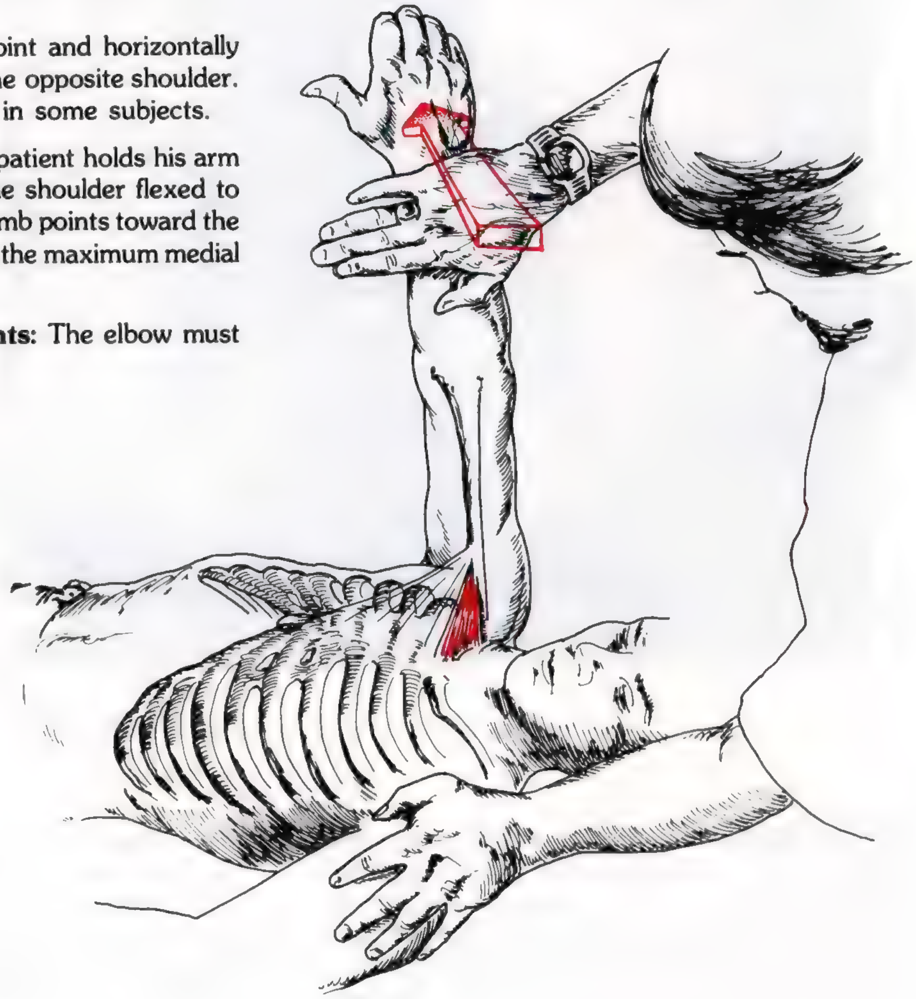
Origin: Anterior surface of sternal half of the clavicle.

Insertion: Lateral lip of the bicipital groove of the humerus.

Action: Flexes the shoulder joint and horizontally adducts the humerus toward the opposite shoulder. Participates in medial rotation in some subjects.

Testing Position: The supine patient holds his arm extended at the elbow, with the shoulder flexed to 90° in medial rotation so the thumb points toward the feet. It is very important to have the maximum medial rotation.

Patient Fixation Requirements: The elbow must be maintained in extension.



18—20. Pectoralis major (clavicular division) muscle test. Patient's arm should be maintained in medial rotation and the elbow extended. Testing pressure is linear with muscle fibers in the direction of the arrow.

Stabilization: The examiner stabilizes the patient on the opposite shoulder to prevent him from rolling about the vertical axis. Care must be taken not to cause pain to the patient's opposite shoulder while stabilizing.

Synergists: Biceps brachii, pectoralis major (sternal division), latissimus dorsi.

Test: Pressure is directed on the distal end of the forearm in the direction of abduction and slight extension of the shoulder. The direction of pressure can best be determined if the examiner visualizes a line from the origin to the insertion, with the direction of pressure extending from that line, giving best alignment of the fibers of the clavicular portion. The vector of testing force will vary somewhat between subjects.

Common testing errors occur when the opposite shoulder is allowed to raise from the table, or when the patient is permitted to recruit additional synergistic action of the biceps by flexing the elbow. The examiner should take care not to cause pain at the wrist by hard contact at this bony area. This often happens if the examiner uses only one or two fingers to contact the patient's wrist. It can happen when an examiner uses one or two fingers to direct the testing pressure to demonstrate how weak the individual is. The subject appears weak as he does not continue exerting effort in the test because the testing pressure causes pain.

Body Language of Weakness:

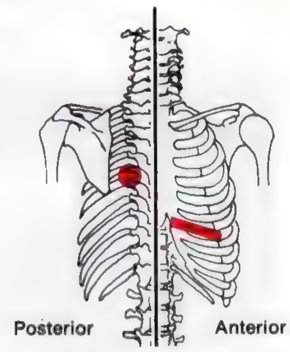
During test: Patient gives excessive resistance against the examiner's stabilizing hand, or flexes his elbow. The patient may also attempt to change the testing direction to recruit the synergistic action of the latissimus dorsi.

Movement aberrations: Difficulty in adducting the arm across the chest in a horizontal position.

Postural imbalances: Shoulder slightly posterior.

Alternate Testing Methods: Muscle can be tested in the standing position against an upright hi-lo table.

NEUROVASCULAR



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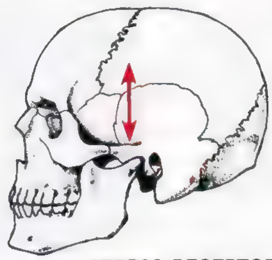


STRESS RECEPTOR

18—21.

Pectoralis Major (Clavicular Division) continued

Extra care must be given to stabilization of the opposite shoulder. The pectoralis major (clavicular division) is frequently tested bilaterally. The effort to recruit synergistic action of the biceps brachii is usually more apparent when the muscles are tested bilaterally.

Nerve Supply: Lateral pectoral, **C5, 6, 7**

Neurolymphatic:

Anterior: 6th intercostal space from mammillary line to sternum on left, which usually affects both right and left muscles. Occasionally found on right, affecting the right pectoralis major (clavicular division). When found on right, always evaluate to determine if the patient is switched.

Posterior: Between T6-7 near laminae on left.

Neurovascular: Bilateral frontal bone eminences

Nutritional: Vitamin B, betaine hydrochloride, stomach concentrate or nucleoprotein extract with vitamin B_{12}.

Meridian Association: Stomach

Organ Association: Stomach

General Discussion: When the pectoralis major (clavicular division) muscles are tested simultaneously, a bilateral weakness often clinically indicates a hydrochloric acid deficiency. The muscles are usually strengthened by having the patient taste hydrochloric acid as provided by nutritional suppliers, or by cranial fault correction. In younger individuals, it is nearly always possible to obtain normal hydrochloric acid production by the correction of the cranial fault(s). In older individuals, hydrochloric acid supplementation is sometimes necessary.

A bilateral weakness of the pectoralis major (clavicular division) can sometimes be masked by a bilateral weakness of the lower trapezius muscle, which may be present as a result of a dorsolumbar fixation.[20] It appears that when the lower trapezius is weak, it causes facilitation of the pectoralis major (clavicular division) on a basis of reciprocal innervation. It is clinically observed that when the dorsolumbar fixation is corrected and strength is returned to the bilateral lower trapezius, the bilateral pectoralis major (clavicular division) which previously tested strong now tests weak.

Not all bilateral pectoralis major (clavicular division) weakness is indicative of hydrochloric acid deficiency. It is possible to have the muscles involved on each side by any of the five factors of the IVF, such as neurolymphatic, neurovascular reflexes, etc. Generally, in the presence of bilateral pectoralis major (clavicular division) weakness as a result of some factor other than hydrochloric acid, there will be weakness of each muscle tested individually; the muscles will also be weak tested together. The usual finding in hydrochloric acid deficiency is strength of the muscles when tested individually, or only one muscle weak; on testing the muscles simultaneously, there is weakness of one or both muscles.

Occasionally there is indication from the TS line and postural and meridian analysis that the pectoralis major (clavicular division) should test weak, but it does not on manual muscle testing. Goodheart[13] describes this as "recruiting" of the opposite pectoralis major (clavicular division), and recommends placing the non-tested arm across the thorax. When this is done, care should be taken to prevent accidental therapy localization from the hand of the non-tested arm. It seems that there is some type of afferent impulse arising from the contraction of the non-tested muscle, reflexing in the cord to facilitate the tested muscle. When the arm of the non-tested side is placed across the thorax, it changes the contraction which develops as a result of stabilizing the shoulder on the side opposite the test. It is clinically observed that when weakness of the pectoralis major (clavicular division) is present with the opposite arm across the thorax, the usual approaches in applied kinesiology for strengthening a weak muscle will cause the tested muscle to regain its strength even though the non-tested arm is placed across the thorax.

The pectoralis major (clavicular division) appears to indicate some types of emotional disturbance. It is clinically observed in applied kinesiology that if a subject concentrates on something emotionally upsetting to him, a weakness of the pectoralis major (clavicular division) will develop as observed on manual muscle testing. The neurovascular reflex found in AK to correlate with this muscle is Bennett's "emotional reflex,"[5] located on the frontal eminences of the frontal bone. The correlation of this muscle with emotions seems to be appropriate in light of the number of health problems which develop in the stomach with emotional disturbances.

DeSousa et al.[8] found in ten of twenty cases studied that the pectoralis major (clavicular division) was active in medial rotation during movement of the freely hanging arm. The figure rose to fourteen of twenty when resistance was added. When the arm was abducted to 90°, there was activity of the clavicular portion, but in fewer subjects. Needle electromyographic studies show the pectoralis major (clavicular division) to be synchronously active with the anterior deltoid in forward flexion of the arm. It reaches its primary peak of activity at 75°, and a secondary peak at 150°.[16] It is the chief flexor of the shoulder joint.[19]

Pectoralis Major (Sternal Division)

18—22. Pectoralis major (sternal division). Patient's arm should be maintained in medial rotation.

Origin: Sternum to 7th rib, cartilages of true ribs and aponeurosis of external oblique abdominal muscle.

Insertion: Lateral lip of the bicipital groove of the humerus.

Action: Adducts humerus toward opposite iliac crest; major anterior shoulder stabilizer.

Testing Position: Supine patient holds arm extended at the elbow, and shoulder flexed to 90° in medial rotation so the thumb points toward the feet.

Patient Fixation Requirements: Patient holds elbow in extension. The abdominal muscles must be capable of stabilizing the thorax to the pelvis.

Stabilization: Examiner stabilizes on the opposite anterior superior crest of the ilium. The patient's body weight provides the majority of stabilization; thus the examiner only has to prevent him from rotating around the vertical axis. Care should be taken to avoid causing pain to the patient with excessive pressure of the stabilizing hand. If the abdominal muscles are not adequate for stabilizing the thorax to the pelvis, the examiner must do so.

Synergists: Latissimus dorsi, subscapularis, teres major.

Test: Pressure is directed on the distal forearm in the direction of abduction and increased shoulder flexion. The best alignment of pressure can be observed by drawing an imaginary line from the middle of the origin through the center of the insertion; the direction of pressure extends from that line.

Body Language of Weakness:

During test: The patient's effort is toward reduced flexion and adduction. If he attempts to bring the test more into adduction, this is an

Pectoralis Major (Sternal Division) continued

18—23. Patient's arm should be maintained in medial rotation. Testing pressure is linear with muscle fibers in the direction of the arrow.

effort to recruit the pectoralis major (clavicular division). If the movement is more toward reduced flexion, the effort is toward recruitment of the latissimus dorsi, teres major, and subscapularis.

Movement aberrations: This is an important muscle in activities which require quick, downward thrusting of the arm, such as hammering. Weakness diminishes this ability.

If the patient's arm is placed directly overhead while supine, it will be difficult to lift it if the pectoralis major (sternal division) is weak.

Postural imbalances: Shoulder in slight posterior position relative to trunk.

Alternate Testing Methods: For a weight-bearing test, allow the patient to stabilize against a wall or an upright hi-lo table. Extra care must be taken by the examiner to insure proper stabilization in the standing position.

Nerve Supply: Lateral and medial pectoral, **C6, 7, 8, T1**

Neurolymphatic:

Anterior: 5th intercostal space from mammillary line to sternum on right, which usually affects both right and left muscles. Occasionally the neurolymphatic reflex may be found on the left, especially if there is left pectoralis major (sternal division) weakness. If therapy localization to the left side strengthens the muscle, consider the possibility of switching and treat accordingly.

Posterior: Between T5-6 near laminae, usually on right.

Neurovascular: Bilateral 1½" up from prominent bulges on anterior frontal bone, 1½" from midline.

Nutritional: Vitamin A, bile salts, liver concentrate or nucleoprotein extract.

Meridian Association: Liver

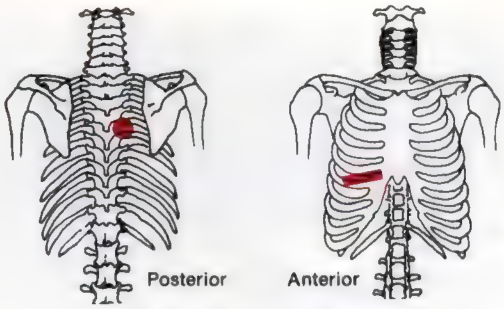
Organ-Gland Association: Liver

General Discussion: This muscle is excellent when an indicator muscle of the upper extremity is needed. It is better than the clavicular division because it is much more difficult for the patient to flex the elbow, thereby changing the test. The muscle is fairly easy to isolate, and when synergistic action changes the test, it is easy for the knowledgeable manual muscle tester to observe.

The rhomboids have an antagonistic function to the pectoralis major and minor. When the anterior muscles are weak, the rhomboids may have secondary contraction. This is often exhibited by a very tight mid-thoracic spine. The patient may state that it would feel good to sleep with a tennis ball placed between the shoulder blades. The primary correction is to return the pectoralis muscles to normal. It may be necessary to use spray and stretch, fascial release, or proprioceptive treatment to the rhomboids.

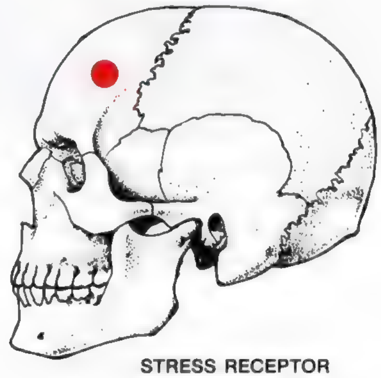
Sometimes photophobia is body language which indicates liver involvement. Clinical experience in applied kinesiology reveals that vitamin A is often the necessary nutrition for strengthening the pectoralis major (sternal division) muscle, associated with the liver. In this case, it is clinically observed that vitamin A supplementation often corrects the photophobia.

Electromyographic evidence credits minimal activity of the pectoralis major (sternal division) for medial rotation of the arm.[2, 8]



NEUROLYMPHATIC REFLEX
USUALLY ON RIGHT ONLY

NEUROVASCULAR



STRESS RECEPTOR

Pectoralis Minor

Origin: 3rd, 4th, and 5th ribs near the costal cartilage.

Insertion: Coracoid process of the scapula.

Action: Pulls coracoid process anterior, medial, and inferior; an important anterior shoulder stabilizer.

Reversed Origin-Insertion and Change of Action: When the scapula is fixed, it aids in rib elevation in forced inspiration.

Testing Position: Supine patient with arm at side lifts shoulder off the table, drawing coracoid process anterior, medial and caudal.

Patient Fixation Requirements: Abdominal muscles must fix thorax to pelvis.

Stabilization: Generally, the patient's body weight provides sufficient stabilization. If the abdominal muscles cannot stabilize the thorax to the pelvis, it is necessary either to strengthen them by the usual applied kinesiology techniques prior to the test, or for the examiner to stabilize the thorax.

Synergist: Pectoralis major

Test: Pressure is directed against the shoulder toward the table. Make certain the patient does not substitute by using his arm to force the shoulder from the table.

Body Language of Weakness:

During test: Patient attempts to elevate shoulder by pushing against the table with the arm on the tested side. It may be necessary to have the patient hold his arm away from the examination table.

Postural imbalance: Weakness allows shoulder to be carried in a posterior position. The usual postural imbalance is that of pectoralis minor tightness, which causes a rolled-forward appearance of the shoulder.

Nerve Supply: Medial pectoral nerve from brachioplexus, C6, **7**, **8**, T1.

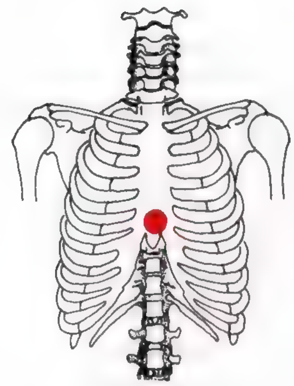
Neurolymphatic:

Anterior: Immediately above xiphoid process on the sternum. Manipulate until pain on digital pressure ceases.[12]

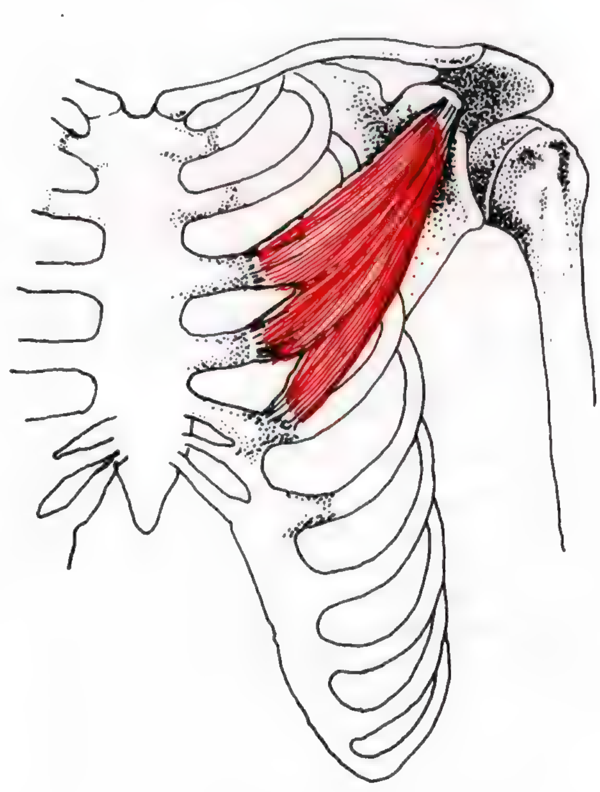
Posterior: None

Reactive Muscle Correlation: Serratus anticus, supraspinatus, deltoid.

Nutritional: Brain concentrate or nucleoprotein extract, ribonucleic acid, niacin or niacinimide, B complex.



NEUROLYMPHATIC



18—24. Pectoralis minor muscle.

18—25.

General Discussion: The pectoralis minor muscle is difficult to test because of the examiner's lack of leverage and the synergism of the pectoralis major. The muscle is often weak on a reactive muscle basis, or as observed on muscle stretch response. When stretching the muscle prior to re-testing, it should be stretched rapidly as it appears to have a predominance of fast muscle fibers.

Shortness of this muscle is responsible for one of the shoulder-arm syndromes, as the neurovascular bundle passes between the pectoralis minor and the thoracic cage. Faulty posture, to which tightness of the pectoralis minor contributes, can cause compression or irritation which creates symptoms of neurologic or circulatory nature.[17] Tightness of the pectoralis minor may be secondary to a weakness of the lower trapezius.[17] In applied kinesiology, there is a clinical correlation of bilateral lower trapezius weakness with a thoracolumbar vertebral fixation. Correction of the fixation appears to be primary in regaining normal length of the pectoralis minor. Often it is necessary to use fascial release, spray and stretch, or proprioceptive technique directly on the pectoralis minor. When this muscle is tight, there will usually be tenderness at the coracoid process and the origin of the muscle on digital pressure.

When the pectoralis minor is shortened, it limits thoracic cage excursion, thus interfering with the full range of potential vital capacity. This can easily be demonstrated on one's self by taking a full breath and observing the excursion of the thorax; then when in the expiration phase, roll the shoulders forward as if there were a tight pectoralis minor. Upon again taking a full breath, it will be noted that the thorax is considerably limited by the postural position, thus limiting inhalation.

Subclavius

Origin: 1st rib at the junction of the costal cartilage.

Insertion: Groove on the inferior surface of the clavicle, between the costoclavicular and conoid ligaments.

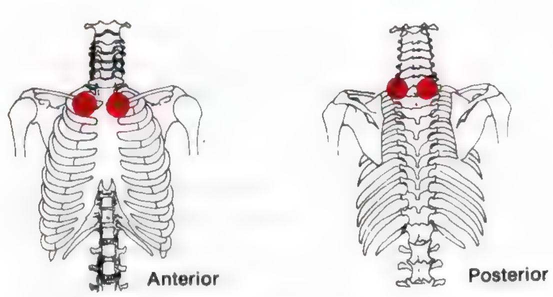
Action: Draws the clavicle inferior and anterior; appears to participate in the "crank" action of the clavicle during shoulder abduction.

Test: This muscle cannot be tested by the usual manual muscle testing procedures. It is tested clinically by therapy localization. The patient therapy localizes to the belly of the muscle, and the examiner tests a previously strong indicator muscle. If the subclavius is involved, the strong indicator muscle will weaken. The usual precaution — that therapy localization only tells **where** something is, not **what** it is — must be observed. It is possible to have positive therapy localization over the subclavius muscle when actually the neurolymphatic for the anterior neck flexors — or some other factor — is involved.

Body Language of Weakness: The subclavius appears to be partly responsible for the rotational motion of the clavicle during arm abduction. When there is limitation of arm movement that equates with the 30° of scapula rotation obtained by clavicular rotation, the subclavius should be considered for possible involvement.

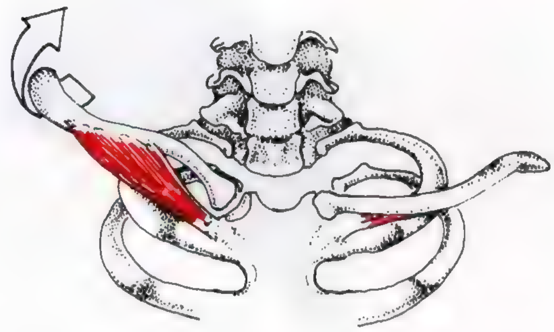
Nerve Supply: Branch of the brachioplexus, **C5, 6**

Neurolymphatic:
- **Anterior:** Junction of the clavicle, sternum, and 1st rib
- **Posterior:** lamina of T1

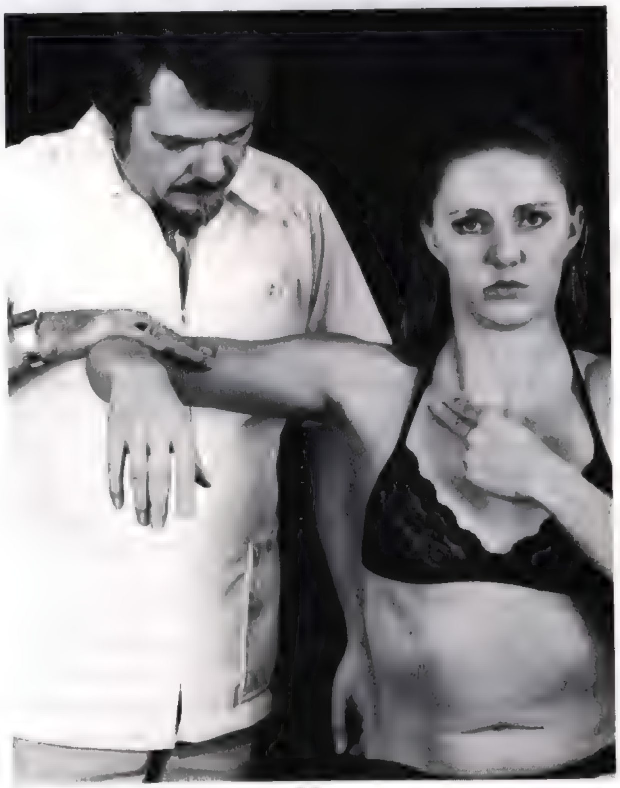


NEUROLYMPHATIC

General Discussion: The treatment generally found effective for the subclavius muscle is related directly with the muscle, such as proprioceptive, fascial release, or possibly spray and stretch technique.



18—26. The distal end of the right clavicle is elevated and there is slight disarticulation from the sternum to reveal the insertion of the subclavius muscle. The rotation of the clavicle in this picture is opposite normal to show the insertion of the muscle.



18—27. Indirect test of subclavius muscle by therapy localization, using the middle deltoid as an indicator muscle.

Deltoid (Middle Division)

Origin: Upper surface of acromion process

Insertion: Deltoid tuberosity of humerus

Action: Abduction of the shoulder

Testing Position: Patient in sitting or standing position holds humerus in 90° abduction with no rotation. The elbow is flexed to 90° to observe for humerus rotation.

Patient Fixation Requirements: The scapula must be fixed. Primary fixation is from the upper trapezius and serratus anticus.

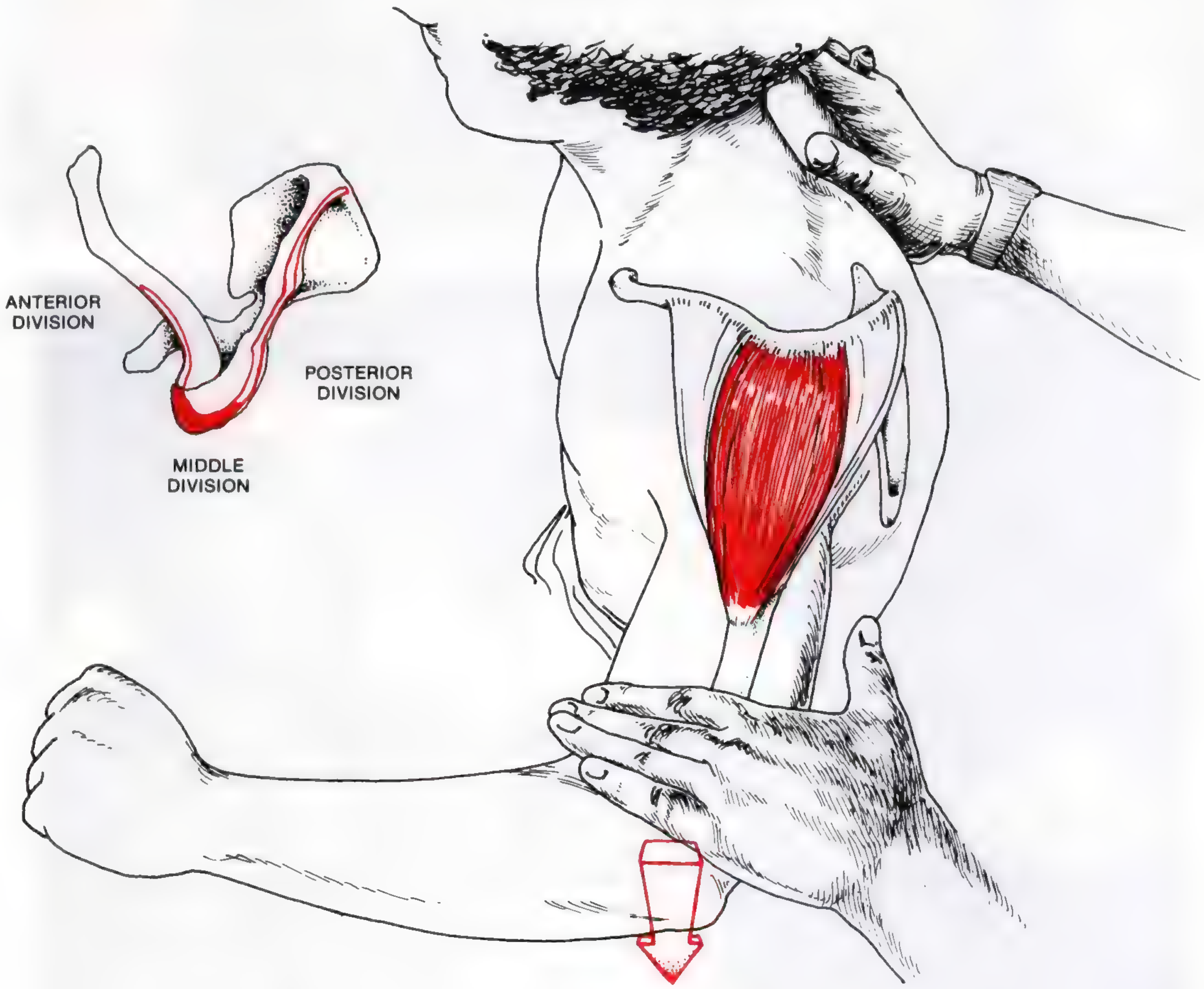
Stabilization: The examiner must guard against the patient changing position. In the presence of a strong middle deltoid, there is little attempt by the patient to shift position; stabilization may not be required. Scapular stabilization is required if the fixator muscles are weak.

Synergists: Supraspinatus and other divisions of the deltoid.

Test: Pressure is applied against the distal end of the humerus in straight adduction.

Body Language of Weakness:

Testing position: When the patient's arm is placed into the testing position, there may be a change of position if the middle and anterior deltoids are weak, or if the middle and posterior deltoids are weak. If the middle and anterior deltoids are weak and the posterior deltoid strong, there will probably be external rotation and slight extension of the humerus, as it is moved mostly by



18—28. Testing force is directed toward straight adduction. Patient's arm is in neutral rotation, with the forearm level with the floor.

Deltoid (Middle Division) continued

the posterior division. If the middle and posterior deltoids are weak and the anterior deltoid is strong, there will be slight medial rotation and flexion of the humerus.

During test: Patient attempts to laterally flex trunk away from muscle being tested, or elevates shoulder with upper trapezius action. There may also be an attempt to change arm rotation, or introduce flexion or extension into the test to recruit more activity from the anterior or posterior deltoid.

Movement aberrations: Loss of strength after 20° of abduction. Care must be taken not to evaluate inability to abduct the shoulder as a deltoid fault. There is complex synergistic action necessary for this activity (see Volume IV).

Postural imbalances: Weakness of the middle deltoid does not cause a postural imbalance. If the head of the humerus is misaligned inferiorly in the glenoid cavity, there is evidence of weakness or paralysis of both the deltoid and the supraspinatus. The supraspinatus is responsible for keeping the head of the humerus in the glenoid cavity when the arm is tractioned inferiorly.[3]

Alternate Testing Methods: May be tested either supine or prone, using the same basic testing methods.

Nerve Supply: Axillary, **C5, 6**

Neurolymphatic:
Anterior: 3rd intercostal space near sternum.
Posterior: Between T3-4 near laminae.

Neurovascular: Bregma

Reactive Muscle Correlation: Rhomboids, pectoralis minor.

Nutritional: Lung concentrate or nucleoprotein extract, vitamin C, RNA

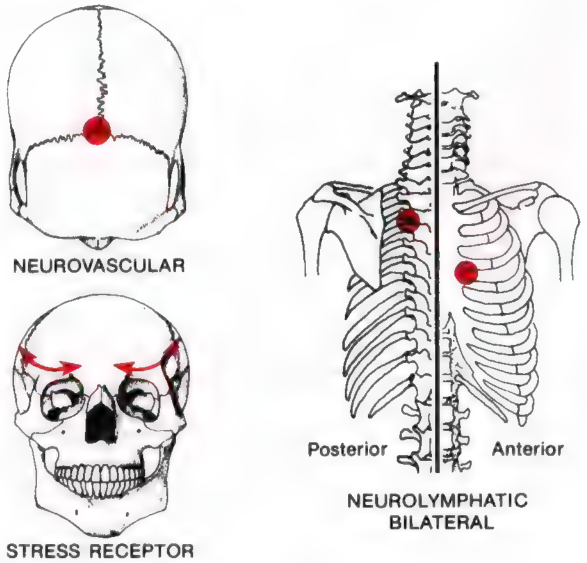
Meridian Association: Lung

Organ Association: Lung

General Discussion: Bilateral deltoid weakness is clinically correlated in AK with a vertebral fixation at the cervical-dorsal junction. Generally this is tested with the middle division of the deltoid muscles. The anterior and posterior divisions should also be included in the evaluation for fixations if there is no bilateral weakness of the middle deltoid muscles. A

18—29.

18—30. Patient laterally shifting trunk during deltoid test. This changes parameters and gives erroneous information.



bilateral lower trapezius weakness can mask a bilateral deltoid weakness. Correction of the lower trapezius weakness will immediately reveal the bilateral deltoid weakness, if present (see page 80).

During gait activity, electromyographic evaluation shows consistent activity of the middle deltoid muscle in both flexion and extension of the arm at the shoulder joint.[15] During walking, it is necessary to have slight abduction of the arm to clear the trunk. Electromyography shows activity of both the middle deltoid and the supraspinatus muscles to allow the arm to pass the trunk. The scapula is also fixed to the trunk by the trapezius and rhomboid muscles.[9]

Inman et al.[16] demonstrated that the deltoid has its greatest activity between 90° and 180° of elevation. This was confirmed by Yamshon and Bierman,[24] who found that in the erect position, the deltoid has greater activities when the motions of the arm are performed above the horizontal plane as opposed to being carried out below it.

Most authorities have considered that the supraspinatus initiates the activity of abduction, and the deltoid carries out the activity past approximately 20°. Electromyography shows that both muscles are active throughout the range of abduction.[2]

When the arm is abducted to 90° and the hand moved posteriorly, there is electrical activity of the middle deltoid, but there is none if the arm is moved anteriorly. This indicates that the middle deltoid aids the posterior deltoid in this action, as well as possibly providing some external rotation.[21]

Deltoid (Anterior Division)

Origin: Lateral 1/3 of clavicle on its anterosuperior border.

Insertion: Deltoid tuberosity of humerus.

Action: Abduction of humerus in combination with other portions of the deltoid; flexes and medially rotates the humerus.

Testing Position: Patient seated or standing, arm held in 90° abduction with slight lateral rotation and slight flexion. The elbow is flexed at 90° to indicate the amount of arm rotation.

Patient Fixation Requirements: Adequate scapula fixation, primarily by the upper trapezius, pectoralis minor and serratus anticus, is mandatory. The examiner's stabilization helps fix the scapula.

Stabilization: Examiner stabilizes on the superior-posterior aspect of the shoulder, keeping the patient from elevating the scapula or flexing the trunk.

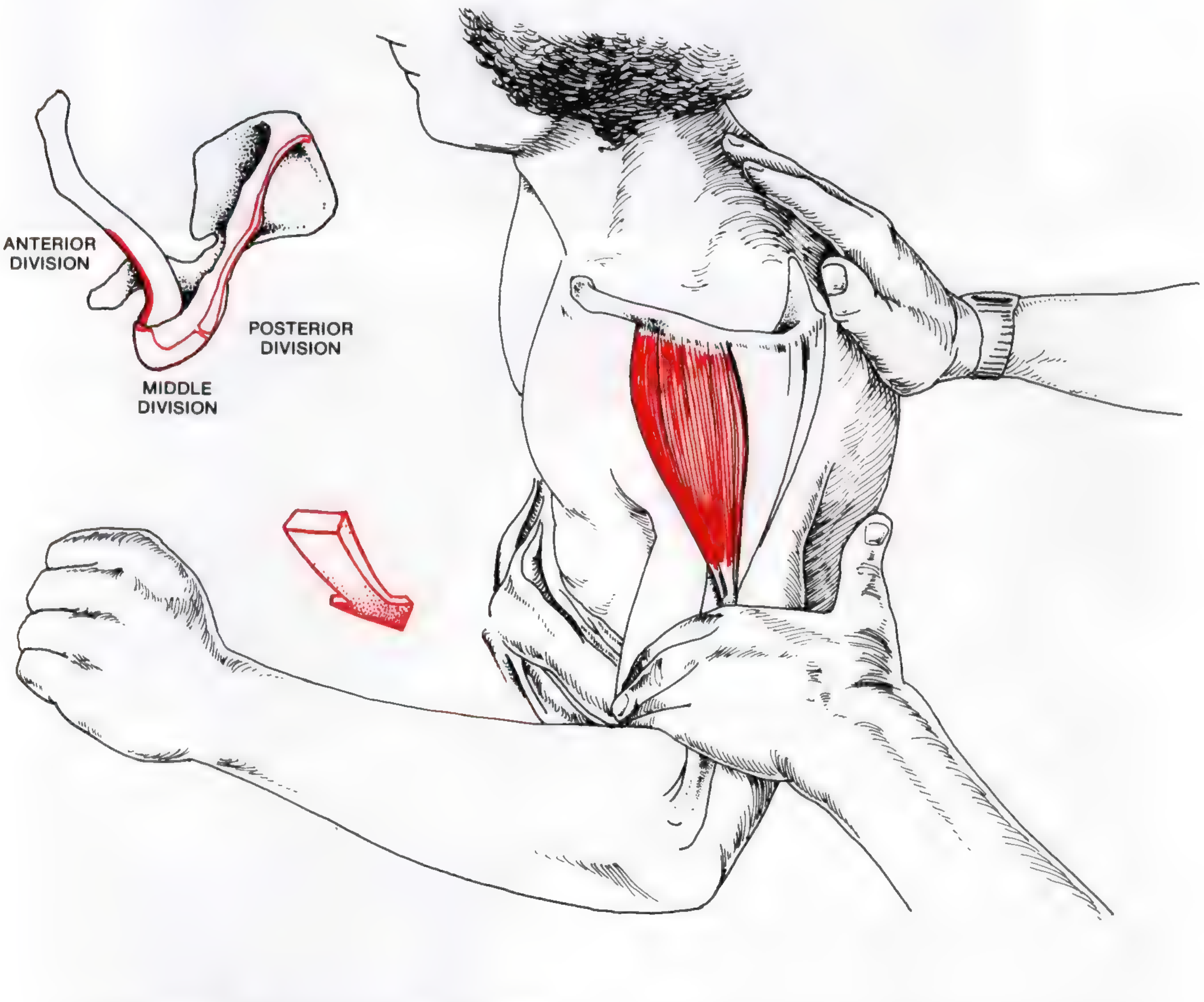
Synergists: Supraspinatus and other divisions of the deltoid.

Test: Contact is made at the distal humerus with pressure in a direction of adduction and slight extension.

Body Language of Weakness:

Testing position: When the patient is placed in the testing position, there will be a tendency to not hold the position to recruit more activity of other divisions of the deltoid.

During test: Patient with weak anterior deltoid



18—31. Test pressure is in the direction of the arrow, toward adduction and slight extension. Patient's arm is in slight external rotation, although the photographic angle does not clearly indicate it.

18—32.

will attempt to raise arm more in straight abduction rather than with the examiner's pressure. This recruits more middle deltoid activity. There will also be an attempt to internally rotate the arm to bring more middle deltoid activity into the test.

When the muscle is weak, the patient will tend to laterally shift the trunk away from the side being tested. This can cause the arm to remain in the same basic position, yet adduction takes place at the shoulder.

Alternate Testing Methods: The prone or supine position can be used with the same basic testing method described above. The examiner must still guard against superior shoulder elevation by upper trapezius action. There is less difficulty with the patient laterally flexing the trunk in these positions.

The anterior deltoid can be tested with the patient in the supine position by having the clenched fist resting on the anterior thorax. Prior to testing the muscle, this section of the thorax should be evaluated for any possible positive therapy localization. The patient therapy localizes to the area while the examiner tests a previously strong indicator muscle. If negative for therapy localization, the test can be used; if not, the positive therapy localization must first be removed by treatment. To test the muscle, the examiner directs pressure on the elbow toward the table. The scapula must be fixed by adequate function of the patient's trapezius, serratus anticus, and pectoralis minor. Care should also be taken that the patient does not use wrist action on the anterior thorax to aid in the test (see 18—33).

Nerve Supply: Axillary, **C5, 6**

Neurolymphatic:

Anterior: 3rd intercostal space near sternum.
Posterior: Between T3-4 near laminae.

Neurovascular: Bregma

Reactive Muscle Correlation: Rhomboids and pectoralis minor.

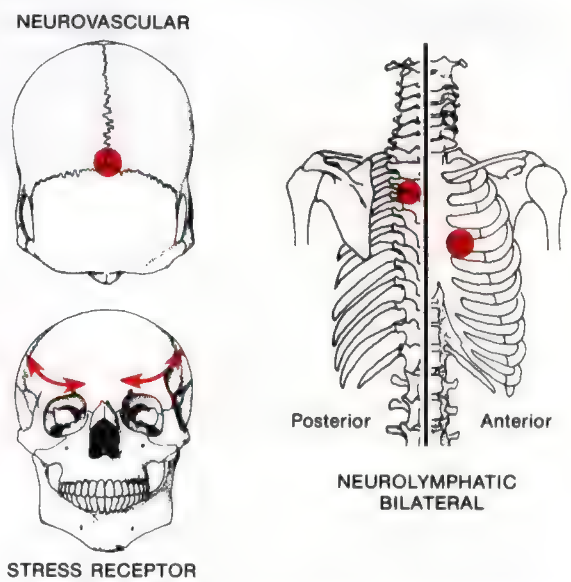
Nutritional: Lung concentrate or nucleoprotein extract, vitamin C, RNA

Meridian Association: Lung

Deltoid (Anterior Division) continued

18—33. The examiner's hand under the patient's helps prevent accidental therapy localization.

Organ Association: Lung



General Discussion: The anterior deltoid is usually tested in applied kinesiology only when there is shoulder dysfunction or an involvement with the gait mechanism. For evaluation of this basic energy pattern and nutrition, the middle deltoid is generally used.

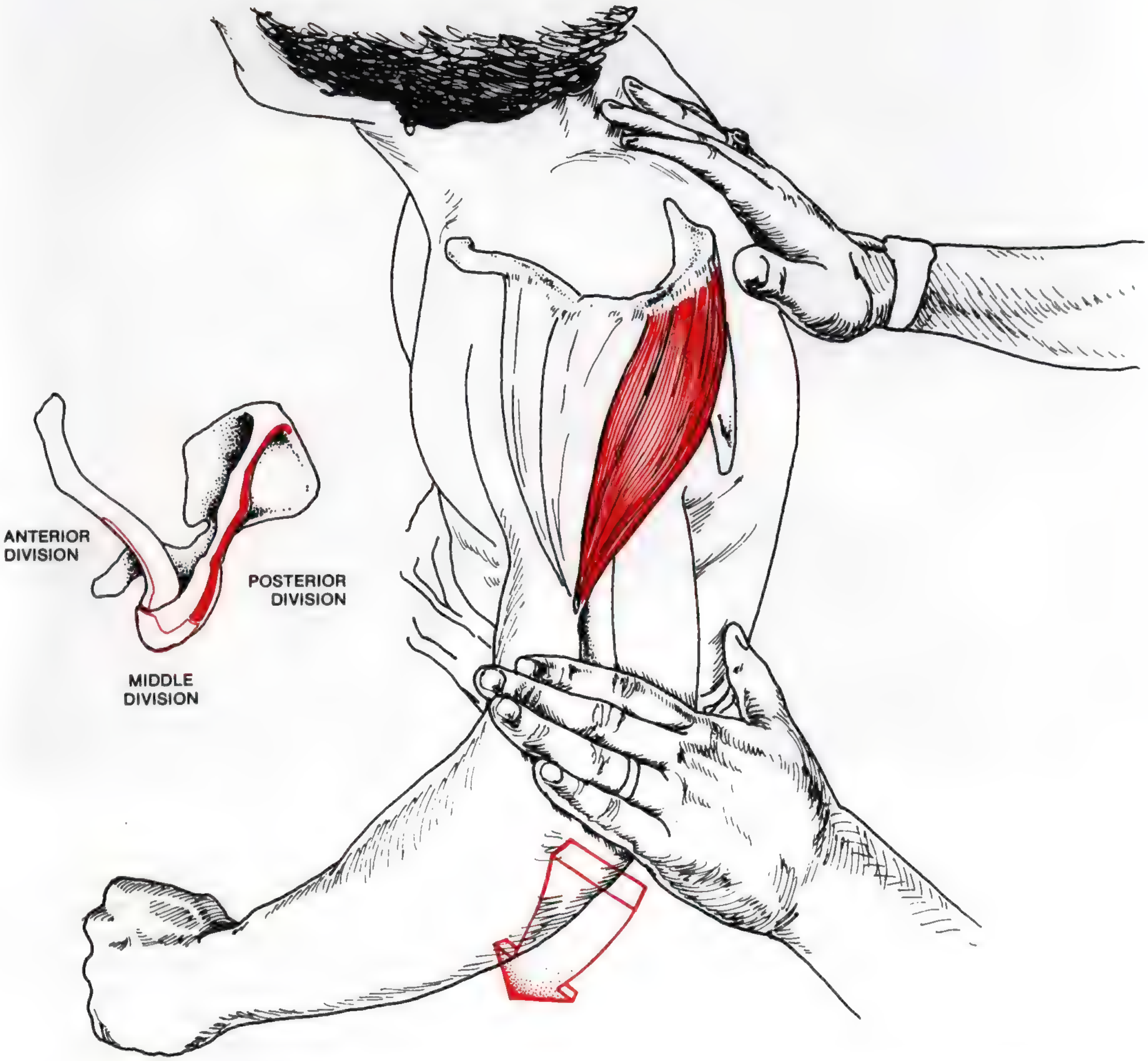
In applied kinesiology, bilateral deltoid weakness indicates a cervical-dorsal vertebral fixation. The anterior deltoid, as well as the other divisions, should be taken into consideration.

The posterior and middle divisions of the deltoid can be weak, while the anterior is hypertonic. Body language indicating this involvement is the patient's inability to reach into his back pocket. Proprioceptive, fascial release, or spray and stretch technique is usually indicated in this case.

Electromyographic evidence attributes forward flexion, abduction, and medial rotation to the anterior deltoid. It is also active during hyperextension of the arm,[24] which seems contradictory to the clinical findings of a shortened (hypertonic) anterior deltoid limiting reaching into a back pocket as noted above.

The anterior deltoid is inactive electromyographically during normal walking and also on a treadmill at an incline of 15°.[15] This was confirmed by Fernandez-Ballesteros et al.[9] with needle electromyography, using radiotelemetering to allow free movement. The step action was recorded by a switch which indicated foot contact. During the forward swing of the arm, neither prime nor assistant flexors were activated. This explains an observation in AK evaluating the gait activity by testing the shoulder flexors and extensors (described on pages 7 and 8). The shoulder flexors do not show a great amount of strengthening when the ipsilateral leg is in approximately the toe-off position of gait. On the other hand, when the ipsilateral leg is approximately in the heel-strike position, the extensors of the shoulder appear to be strengthened considerably as observed by manual muscle testing. It seems probable, though, that the shoulder flexors are inhibited during the shoulder extension phase, since they test weak clinically on manual muscle testing when the ipsilateral leg is in the forward gait position.

Deltoid (Posterior Division)



18—34. Patient's arm is in slight medial rotation. Examiner's force is in the direction of the arrow for adduction and slight flexion. Examiner's stabilizing hand is usually on the anterior. Removed to the posterior in illustration for clarity.

Origin: Inferior lip of spine of scapula

Insertion: Deltoid tuberosity of humerus

Action: Abduction of humerus when working with other sections of deltoid. When working by itself, the action is abduction, slight extension, and lateral rotation.

Testing Position: Sitting or standing, the patient holds the humerus in 90° abduction, with slight extension and medial rotation. The elbow is held at 90° flexion to observe the amount of rotation.

Patient Fixation Requirements: The scapula must be fixed with primary action of the upper and middle trapezius, and some action of the rhomboids and levator scapula.

Deltoid (Posterior Division) continued

18—35.

Stabilization: The patient's shoulder must be stabilized from the anterior. This should also stabilize the trunk against rotation and lateral flexion. The shoulder should not be allowed to elevate with upper trapezius action. If the scapula fixation muscles are inadequate, the examiner or an assistant must help stabilize the scapula.

Synergists: Other divisions of the deltoid and the supraspinatus.

Test: Pressure is directed against the distal end of the humerus in a direction of adduction and slight flexion.

Body Language of Weakness:

Testing position: When in the testing position, the patient will have a tendency to change the humerus position when the examiner's support is taken away, to recruit synergistic action of the middle deltoid and anterior divisions, as well as the supraspinatus.

During test: Elevation of the shoulder with upper trapezius contraction. Shifting of the trunk posterior, and laterally flexing away from the test.

Movement aberrations: Straight lateral abduction efforts will be accompanied by slight flexion of the humerus.

Alternate Testing Methods: The test may be done in the supine or prone position with the same basic procedures.

Nerve Supply: Axillary, **C5, 6**

Neurolymphatic:

Anterior: 3rd intercostal space near sternum
Posterior: Between T3-4 near laminae

Neurovascular: Bregma

Reactive Muscle Correlation: Rhomboids, pectoralis minor

Nutritional: Lung concentrate or nucleoprotein extract, vitamin C, RNA

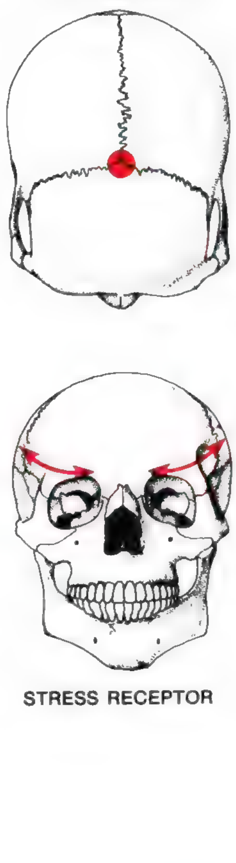
18—36. Poor test. Trunk not stabilized and shoulder not at 90° abduction.

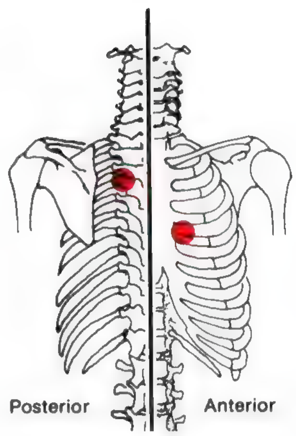
flexors; however, they do not appear to have a gain in strength as do the extensors when the flexors are inhibited. This correlates with the findings of Fernandez-Ballesteros et al.[9] The electromyographic study showed no action potential from the anterior deltoid as the arm flexed forward during walking. Her study did demonstrate action potentials during shoulder flexion of gait from the teres major, upper part of the latissimus dorsi, and the subscapularis muscles, which are medial rotators. Hogue[15] confirmed these findings, showing activity of the posterior deltoid throughout the backward swing of the arm and during the last portion of the forward swing. In his study, the posterior deltoid demonstrated more activity than the other major muscles of the shoulder by electromyography.

Meridian Association: Lung

Organ Association: Lung

General Discussion: The posterior deltoid is active during extension motion of the shoulder during gait as observed on electromyography.[9] Observation of facilitation and inhibition of muscles by manual muscle testing when a normal subject is in a simulated gait position reveals different reaction between the flexors and extensors. When both the flexors and extensors test normal in the neutral standing position, it can be clinically observed in the normal subject that there is a weakening of either the flexor or extensor group when the ipsilateral leg is in the opposite gait position from the shoulder test. For example, if the lower extremity is extended at the hip and flexed at the knee, and toes as if in the latter portion of the stance phase, there will be a weakening of the ipsilateral shoulder extensors observed by manual muscle testing. In the opposite position, where the lower extremity is in the early portion of the stance phase, there will be a weakening of the shoulder flexors and the extensors appear to become much stronger. It is interesting to note that when the extensor muscles of the shoulder are inhibited, there is strength in the





Supraspinatus

Origin: Medial 2/3 of supraspinatus fossa of scapula

Insertion: Superior facet of greater tuberosity of humerus and capsule of shoulder joint.

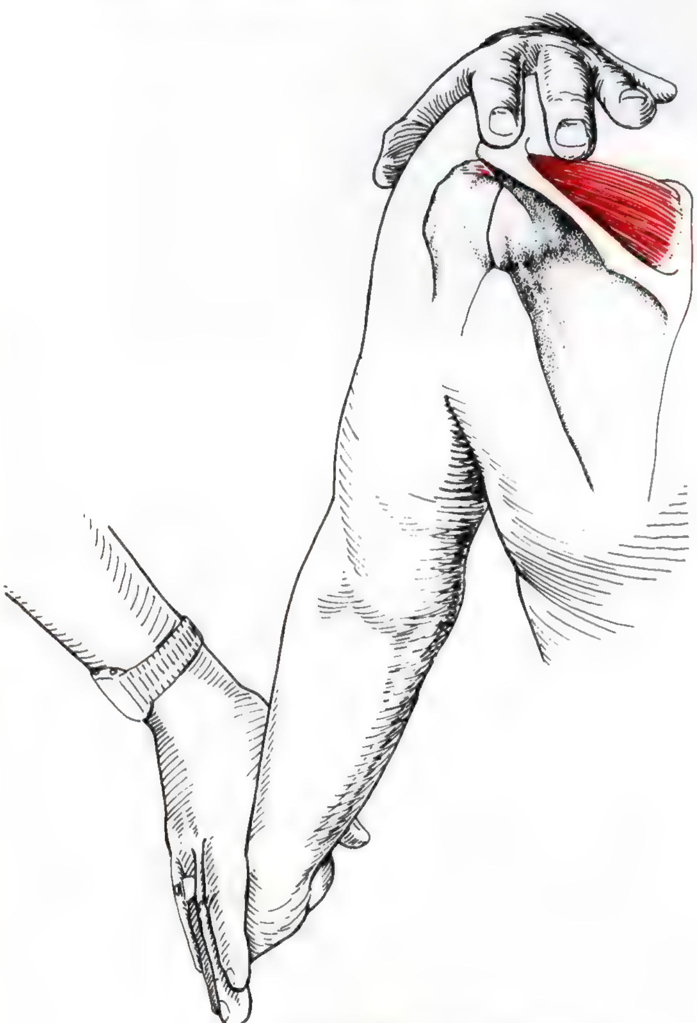
Action: Abducts arm with deltoid. Holds head of humerus in glenoid cavity.

Testing Position: Sitting or standing patient abducts arm approximately 15°. The antecubital fossa should face anterior.

Patient Fixation Requirements: The elbow must be held in extension.

Stabilization: The patient's body must be kept from flexing laterally, and the shoulder should not be allowed to elevate.

Synergists: The deltoid is active in this test. For evaluation of the supraspinatus there must be comparison with deltoid function.



18—37. Supraspinatus muscle test. Antecubital fossa faces anterior.

Test: The examiner contacts the wrist and directs force toward adduction of the arm with slight extension. To determine supraspinatus activity in arm abduction, it is helpful to palpate the activity of the supraspinatus. The patient should turn his head away from the side being examined to relax the upper and middle trapezius, which completely cover the supraspinatus.

Body Language of Weakness:

During test: When the supraspinatus is weak, the patient will frequently attempt to laterally flex the body and to elevate the shoulder by upper trapezius contraction.

Movement aberrations: There is no loss of arm abduction capability from loss of supraspinatus contraction. There will be a loss of total strength of arm abduction, and interference with the general harmony of shoulder activity.

Postural imbalances: Atrophy, or lack of tone, can sometimes be observed in the supraspinatus fossa.

Alternate Testing Methods: The supraspinatus can be tested in the supine or prone position.

Nerve Supply: Subscapular, C4, 5

Neurolymphatic:
Anterior: below coracoid process
Posterior: posterior to transverse process of atlas

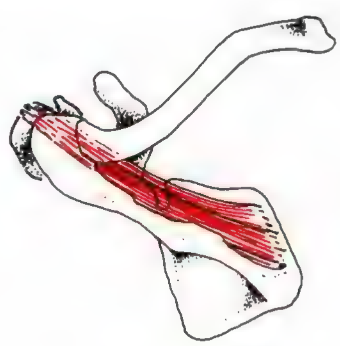
Neurovascular: Bregma

Reactive Muscle Correlation: Rhomboids, pectoralis minor

Nutritional: RNA, brain concentrate or nucleoprotein extract.

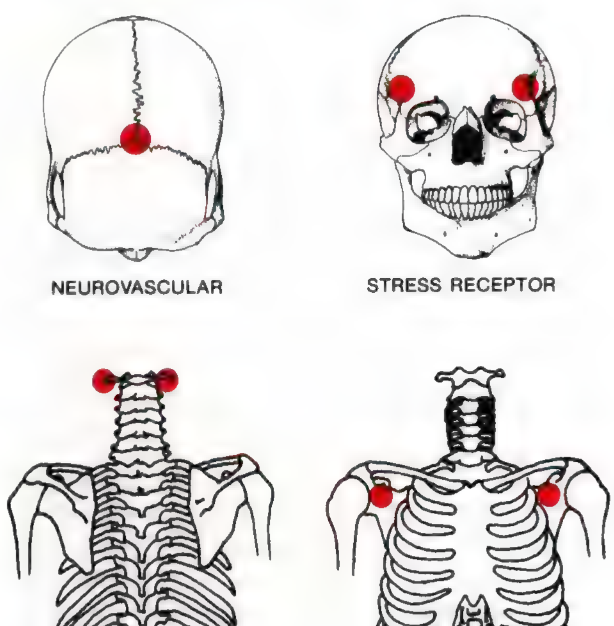
Meridian Association: Conception vessel

Organ Association: Brain



18—38. Superior view.

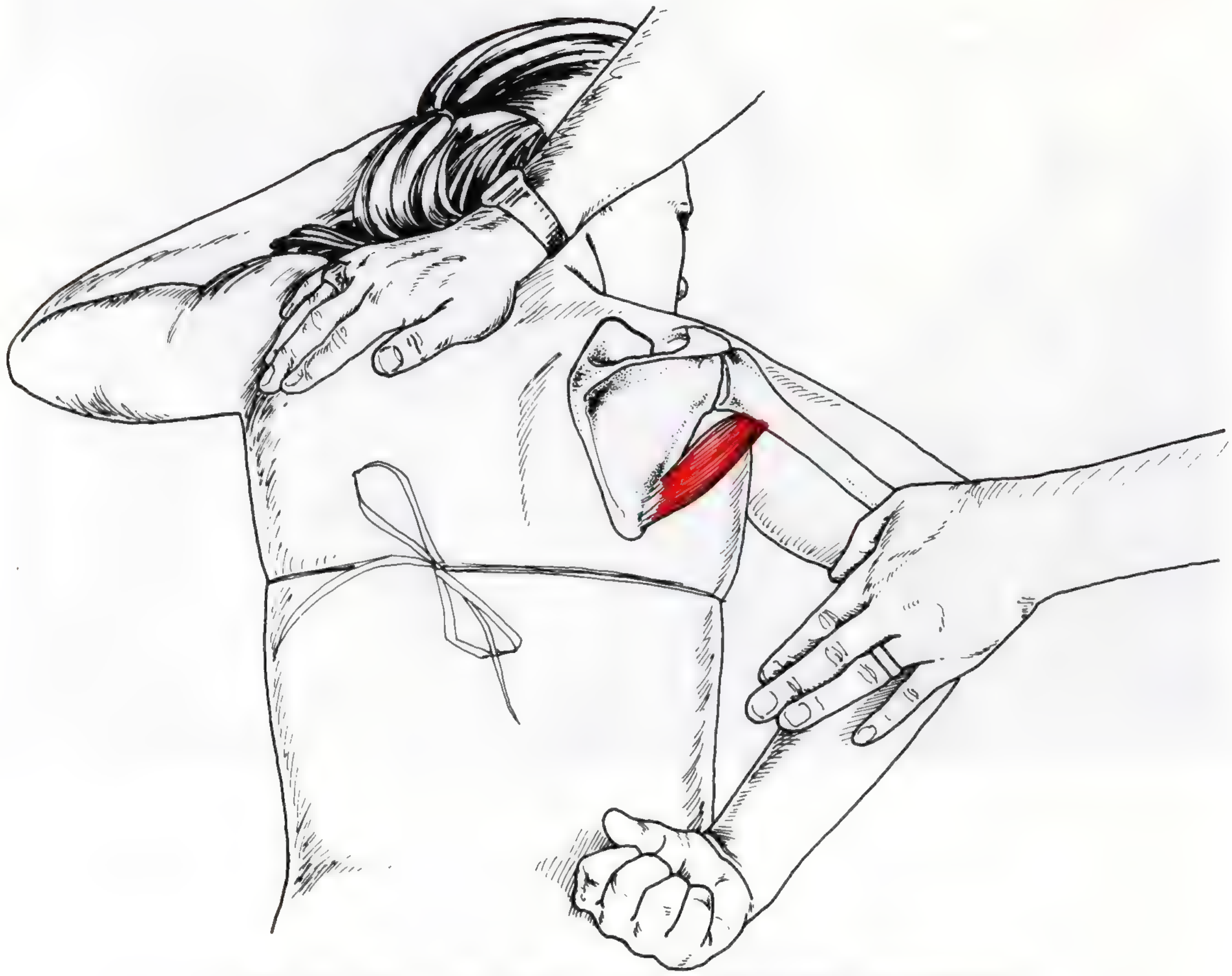
18—39.



General Discussion: The supraspinatus has generally been considered as the muscle which initiates arm abduction; past 15°-20° the deltoid takes over as the supraspinatus becomes ineffective because of its shortening. The requirement for the supraspinatus to initiate abduction has been shown to be incorrect by electromyographic studies.[16] In fact, in the presence of experimental paralysis of the supraspinatus, there is no limitation of abduction of the shoulder; there is only a weakening of abduction.[22]

The supraspinatus is important in preventing inferior dislocation of the head of the humerus from the glenoid cavity. Basmajian and Bazant[3] demonstrated by electromyographic and morphologic studies that the head of the humerus is held from inferior dislocation by the supraspinatus and the superior part of the capsule of the joint. The horizontal fibers of the supraspinatus contribute to the prevention of an inferior dislocation because contraction of the muscle does not let the head of the humerus move laterally; this is required in order to slip down the glenoid fossa, which angles laterally. Electromyographic findings revealed activity of the supraspinatus when downward traction was placed on the arm, but no activity of the deltoid. (Further discussion of shoulder dislocation is presented in Volume IV.)

Teres Major



18—40. Teres major muscle test. Examiner must observe for scapula fixation.

Origin: Dorsal surface of inferior angle of scapula and lower 1/3 of scapular axillary border.

Insertion: Medial lip of bicipital groove of humerus.

Action: Adducts and medially rotates humerus. Extends shoulder joint. Important muscle to act as couple with deltoid in arm abduction (see volume IV).

Reversed Origin-Insertion and Change of Action: When arm is fixed, abducts and elevates inferior angle of scapula.

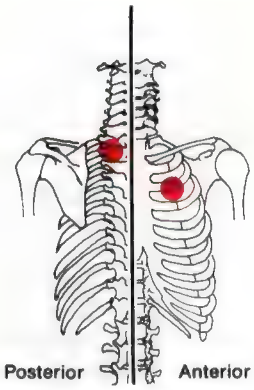
Testing Position: Prone patient abducts and extends shoulder with elbow flexed at 90°, wrist against posterior superior iliac crest. Occasionally a patient does not have adequate range of motion in the shoulder to obtain the testing position. In most cases, the range of motion can be increased by applied kinesiology evaluation and treatment.

Patient Fixation Requirements: Scapula must be fixed by upper, middle, and lower trapezius, as well as by the rhomboids.

Stabilization: If tested bilaterally, none is needed. When tested unilaterally, the patient's weight is usually adequate; however, it may be necessary to stabilize the opposite shoulder to prevent rotation around the vertical axis.

Test: Examiner directs pressure against patient's elbow in a direction of abduction and flexion of the shoulder. Care should be taken not to overpower the patient in this testing position; the shoulder or muscle can be easily injured since the patient is in a position where he cannot yield and the examiner has a great deal of leverage advantage. The position of the scapula should be noted to insure adequate fixation by sections of the trapezius and rhomboids.

18—41.



Body Language of Weakness:

Testing position: Inability to bring the elbow up solidly using shoulder adduction and extension.

During test: When the muscle is weak, the patient will tend to aid in the test with wrist extension over the crest of the ilium. There will also be an attempt to raise the shoulder from the table.

Movement aberrations: Possible difficulty in abduction of the arm from failure of the teres major to act as a couple with the deltoid.

Postural imbalances: Lateral arm rotation causing the palm to face forward. This finding is not too common because of significant synergistic action of the subscapularis, anterior deltoid, pectoralis major, and latissimus dorsi when in the standing position.

Alternate Testing Methods: Can be tested in the seated or standing position. Adequate stabilization is more difficult. For a weight-bearing evaluation, the patient should lean against an upright hi-lo table.

Nerve Supply: Lower scapular, C5, **6**, 7

Neurolymphatic:

Anterior: 2nd intercostal space 2 1/2" from sternum
Posterior: T3 near laminae

Neurovascular (provisional): 1" below the pterion and at the junction of the 1st rib, clavicle, and sternum

Nutritional: Evaluate acid-alkaline balance. When there is excessive perspiration, kelp and/or organic minerals. Zinc, especially when it is difficult to taste food.

Meridian Association: Governing vessel

Organ Association: Generally associated with the spine because of its correlation to thoracic vertebrae fixations.

General Discussion: A bilateral weakness of the teres major indicates probable functional vertebral fixation within the thoracic spine. Correction of the fixation(s) will immediately return normal strength to the teres major. This muscle will generally be strong in the absence of thoracic spine fixations; consequently, no organ association has been developed and the neurovascular reflex location is somewhat in doubt.

In applied kinesiology manual muscle testing, it is important never to let the patient's hands touch his body, thereby preventing accidental therapy localization. In the teres major test, it is necessary to place the posterior wrist against the crest of the ilium. The posterior wrist is not an area of strong therapy localization; however, the possibility does exist. The examiner should be cognizant of this and evaluate for positive therapy localization in the area where the patient will place his wrist; have the patient therapy localize the point and test a previously strong indicator muscle for weakening.

There has been considerable controversy as to the teres major activity on medial rotation. DeSousa et al.[8] observed inactivity of the teres major on medial rotation; further studies by Broome and Basmajian[6] demonstrated no activity on medial rotation of the teres major and free rotation of the shoulder joint, however found it was always active when movement was resisted. Apparently, when there is minimal demand in shoulder rotation the teres major is not active, but is recruited against resistance.

The teres major is very important in acting as a couple with the deltoid in arm abduction. It is often responsible for the so-called "frozen shoulder" syndrome. Differential diagnosis between involvement of the teres major and the teres minor in shoulder abduction syndromes can be obtained by having the patient abduct the arm at the glenohumeral articulation in both medial and then lateral rotation. This changes the relative length of the teres major and minor in the activity (see complete shoulder discussion in Volume IV).

Subscapularis

Origin: Subscapular fossa

Insertion: Lesser tuberosity of humerus and capsule of shoulder joint.

Action: Medially rotates humerus. Draws head of humerus forward and down when arm is raised, acting as part of the force couple of shoulder abduction (see Volume IV).

Reversed Origin-Insertion and Change of Action: When the humerus is stabilized, abducts the inferior border of the scapula.

Testing Position: Patient is in the prone position, with the humerus abducted to 90° and the elbow flexed to 90°. The humerus is in medial rotation.

Patient Fixation Requirements: The scapula is fixed by the rhomboids and trapezius, primarily the middle fibers.

Stabilization: The examiner prevents the humerus from flexing, extending, abducting, or adducting.

Synergists: Teres major, pectoralis major, latissimus dorsi.

Test: Examiner directs pressure against patient's wrist in direction to laterally rotate the humerus, using forearm for leverage.

Body Language of Weakness:

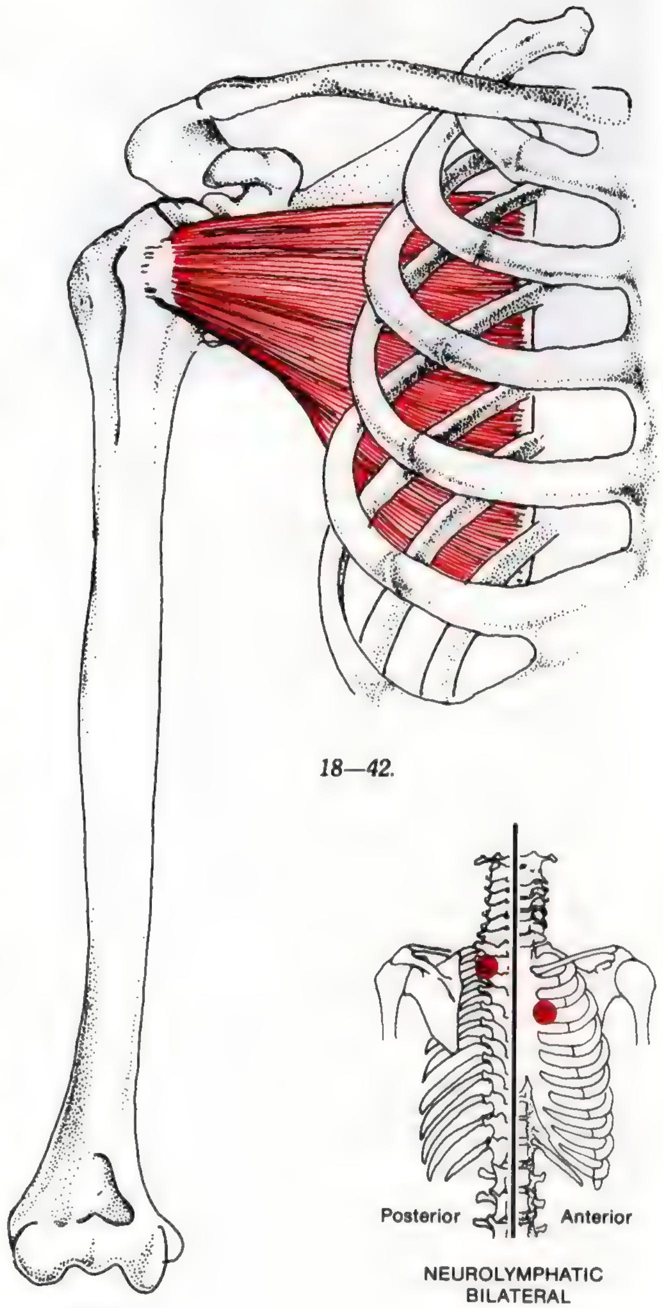
During test: The patient will attempt to change the test by flexing, extending, abducting, or adducting the humerus. There may also be an effort to flex or extend the elbow.

Movement aberrations: An important rotator cuff muscle which acts in coordination with the deltoid during arm abduction. Failure of the rotator cuff muscles may limit arm abduction.

Postural imbalances: Occasionally there may be an external rotation of the arm. This is not frequently seen because of the strength of the synergistic medial rotators of the arm.

Alternate Testing Methods: The test can be done in the supine position. The disadvantage is that the scapula cannot be observed for patient fixation; however, the fixation requirements are not as great because of the weight of the patient on the scapula. The test can also be done in the sitting and standing positions. Stabilization is somewhat more difficult, and the examiner needs to observe for patient trunk rotation or flexion.

Nerve Supply: Upper and lower subscapular, **C5, 6**



18—42.

NEUROLYMPHATIC
BILATERAL

NEUROVASCULAR

STRESS RECEPTOR

18—43. *Starting position of subscapularis test.*

18—44. *Observe failure of scapula fixation by rhomboids and trapezius. The contraction of the teres major acting as a synergist can also be seen.*

Neurolymphatic:
Anterior: 2nd intercostal space near sternum
Posterior: T2-3 between transverse processes

Neurovascular: Bregma

Nutritional: Heart concentrate or nucleoprotein extract, vitamin E, B complex, C

Meridian Association: Heart

Organ Association: Heart

General Discussion: The subscapularis is very important in working as a couple along with other rotator cuff muscles with deltoid activity. Without activity of the rotator cuff muscles, the head of the humerus is pulled superior by the action of the deltoid in abduction. This causes significant glenohumeral stress, especially into the subacromial bursa. The involvement may lead to a frozen shoulder.

There will probably be weakness in the subscapularis when the patient has no increased heart rate with physical activity which is ordinarily sufficient to produce the increased heart rate. The correlation will most frequently be with lymphatic congestion and is treated by neurolymphatic reflex stimulation. An immediate response in heart rate adaptation to stress should be seen.

Occasionally it is necessary to treat the origin or proprioceptors of the subscapularis. This is difficult because the major portion of the muscle is in the subscapular fossa. The muscle can be reached by having the patient lie prone with the arm abducted to 90° and the middle 1/3 resting on the examiner's arm. The distal 2/3 of the patient's arm and forearm provides the weight necessary for lifting the lateral portion of the scapula away from the thorax by a cantilever effect. With the anterior serratus relaxed, the examiner can work up anterior to the scapula with the thumb or fingertips to provide the treatment necessary to the origin or proprioceptors of the subscapularis.

Another method of palpating the subscapularis is described by Brunnstrom.[7] The standing patient flexes at the hips in a toe-touching position. The examiner begins to work his fingers under the scapula, and the patient medially rotates the arm to the maximum amount.

Teres Minor

Origin: Upper 2/3 of dorsal surface of axillary border of scapula.

Insertion: Low on the greater tuberosity of the humerus; capsule of the shoulder joint.

Action: Laterally rotates the humerus and slightly adducts and extends humerus. Stabilizes head of humerus in glenoid cavity during movement, and acts as a couple with the deltoid in arm abduction.

Reversed Origin-Insertion and Change of Action: When the humerus is stabilized, abducts the inferior angle of the scapula.

Testing Position: Patient supine, flexes elbow to 90° and externally rotates humerus.

Patient Fixation Requirements: Scapula must be fixed to the spine by the trapezius (mainly the middle and lower fibers) and rhomboids. This fixation is not as necessary when the test is done in the supine position, because the patient's body weight aids the scapula fixation; however, an additional problem is created in this position because the examiner cannot observe the scapula for lack of fixation.

Stabilization: The examiner stabilizes the elbow to obtain rotation of only the humerus.

Synergist: Infraspinatus, which must be correlated with the test because of very similar action.

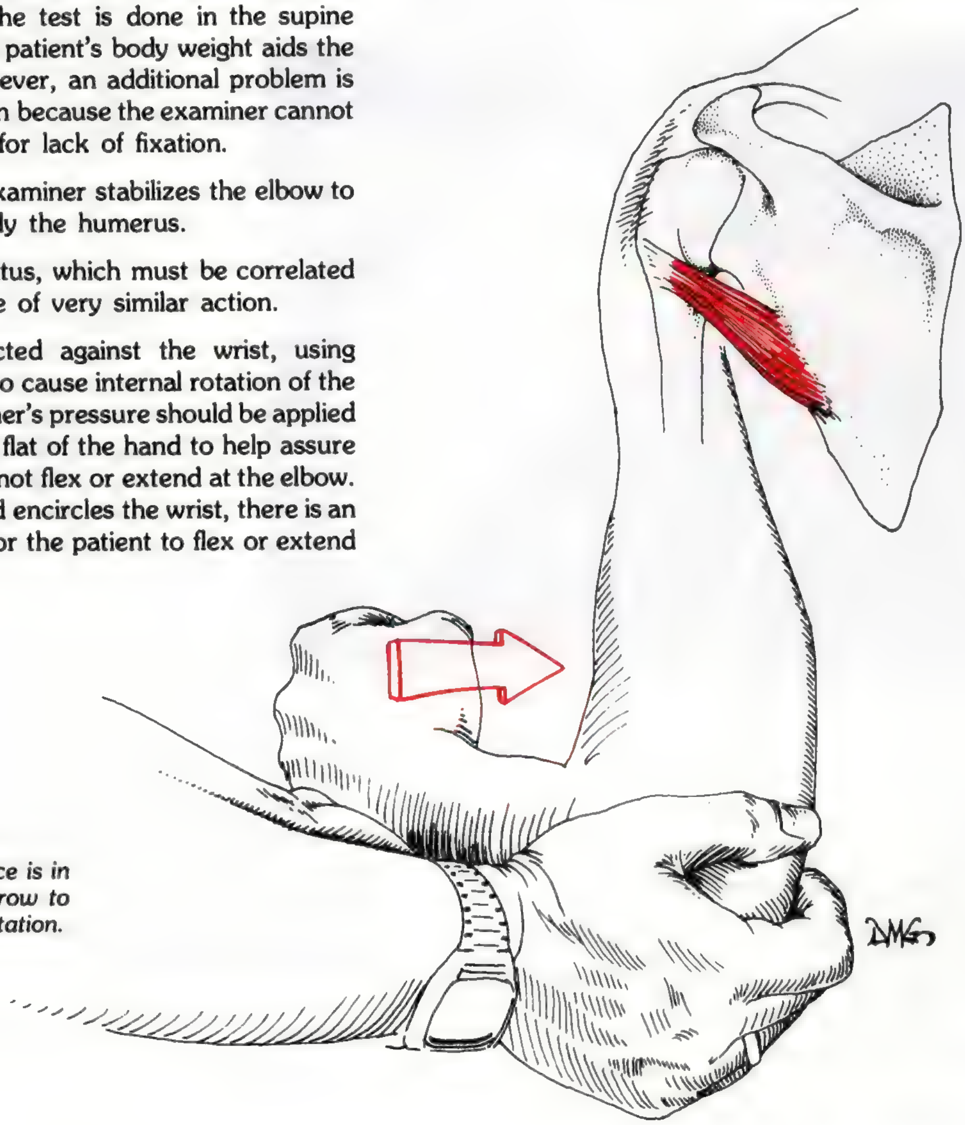
Test: Pressure directed against the wrist, using forearm for leverage to cause internal rotation of the humerus. The examiner's pressure should be applied with the fingertips or flat of the hand to help assure that the patient does not flex or extend at the elbow. If the examiner's hand encircles the wrist, there is an additional tendency for the patient to flex or extend the elbow.

Body Language of Weakness:

During test: Patient may attempt to change the parameters of the test by using biceps or triceps activity for elbow flexion or extension or by moving the humerus in action other than rotation.

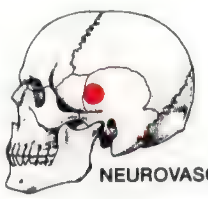
Movement aberrations: Limited range of motion in arm abduction or possibly flexion because of failure of the teres minor to act in couple with the deltoid.

Postural imbalance: Internal rotation of the arm, causing the palm of the hand to face posterior. Care should be taken to observe that rotation is of the humerus and not just the forearm. Forearm internal rotation by itself is usually due to a weak supinator muscle.



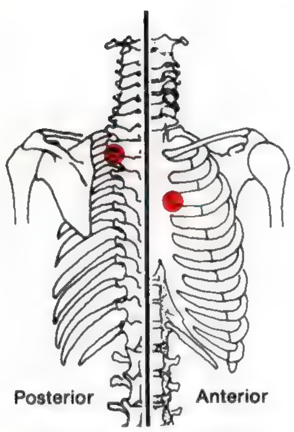
18—45. Examiner's force is in the direction of the arrow to impart internal arm rotation.

18—46.



NEUROVASCULAR

STRESS RECEPTOR



NEUROLYMPHATIC
BILATERAL

Alternate Testing Method: The test can be done in the prone position, which is relatively easy to stabilize and the examiner has ability to view the scapula for fixation. The test can also be done in the seated or standing position. Additional care in stabilization is necessary. The examiner must observe for an attempt to change the plane of the shoulders or to rotate the trunk. In the seated or standing position, additional fixation by the patient's trapezius and rhomboids is necessary.

Nerve Supply: Axillary, C4, **5**, **6**

Neurolymphatic:
- **Anterior:** 2nd intercostal space near sternum
- **Posterior:** T3 lamina

Neurovascular: 1" below the pterion and at the junction of the 1st rib, clavicle, and sternum

Nutritional: Thyroid concentrate or nucleoprotein extract, organic iodine.

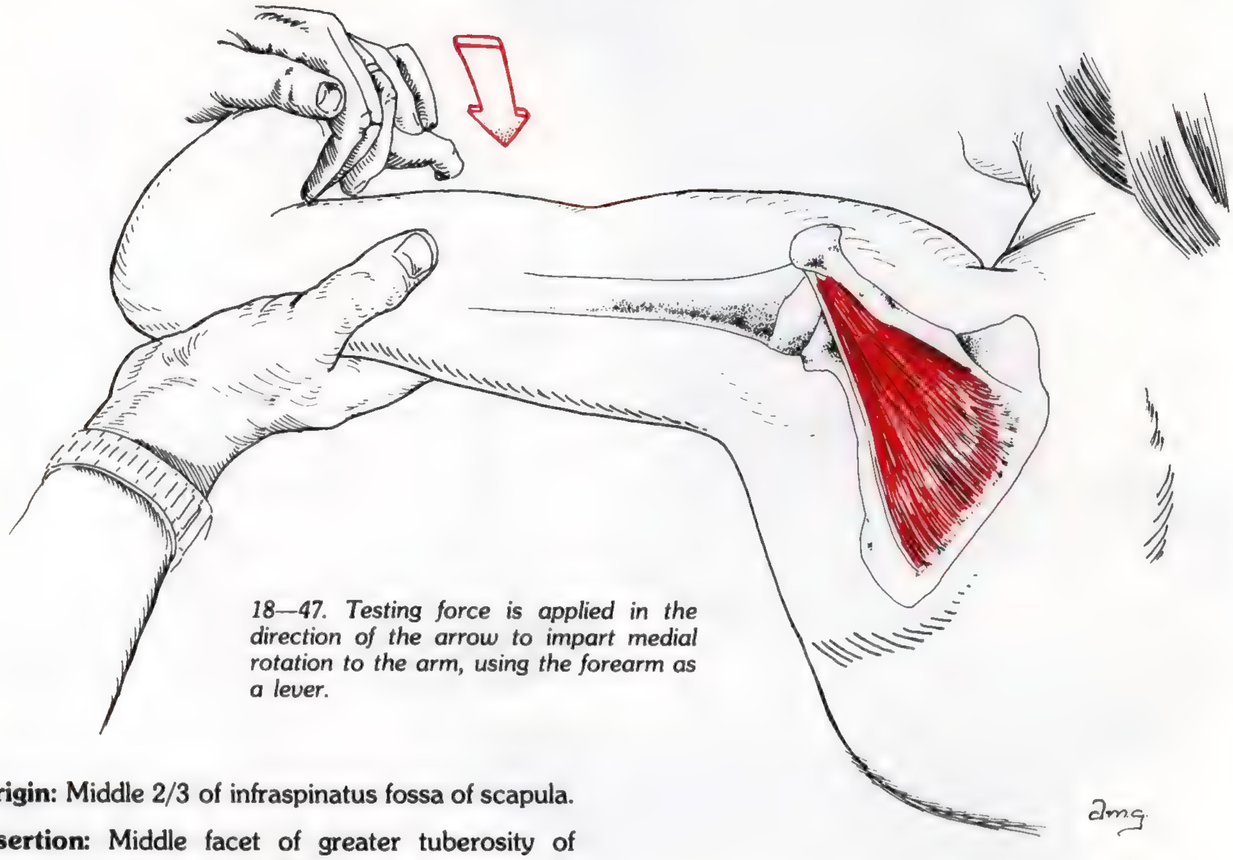
Meridian Association: Triple heater

Gland Association: Thyroid

General Discussion: The teres minor is one of the rotator cuff muscles; consequently, it must act as a couple to hold the head of the humerus down in relation to the glenoid cavity when the arm is being abducted by the deltoid.

The requirement for fascial release is often observed for the teres minor muscle. The application of this treatment frequently is attended by an increase in axillary temperature, which Barnes[1] recommends as a method of thyroid evaluation.

Infraspinatus



18—47. Testing force is applied in the direction of the arrow to impart medial rotation to the arm, using the forearm as a lever.

Origin: Middle 2/3 of infraspinatus fossa of scapula.

Insertion: Middle facet of greater tuberosity of humerus, capsule of shoulder joint.

Action: Lateral rotation of humerus with teres minor. Stabilization of the head of the humerus with the glenoid cavity.

Reversed Origin-Insertion and Change of Action: With the arm fixed, abducts the inferior angle of the scapula.

Testing Position: Prone patient abducts humerus to 90° with external rotation and elbow at 90°.

Patient Fixation Requirements: The scapula requires fixation by the middle and lower trapezius fibers. The rhomboids contribute some to the fixation.

Stabilization: The examiner must stabilize the humerus to avoid abduction, adduction, flexion, and extension.

Synergist: The teres minor is significantly active in this test. Comparison must be made of the teres minor strength with the infraspinatus.

Test: Pressure is directed against the wrist in the direction of internal humerus rotation. During the test, the examiner must observe for adequate scapula fixation. When this is not present, an assistant can aid in the test by stabilizing the scapula.

Body Language of Weakness:

During test: The patient will attempt to change the test by bringing in humerus abduction, adduction, flexion, or extension. The patient may also interfere with the test by attempting to flex or extend the elbow.

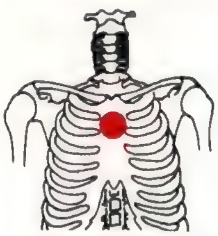
Movement aberrations: Since the muscles of the rotator cuff must act in conjunction with the deltoid for arm abduction, there is often a limitation of shoulder abduction when the infraspinatus and other rotator cuff muscles are weak.

Postural imbalances: Internal arm rotation with the hand consequently facing posterior. Care should be taken that the palm is not facing posterior from internal forearm rotation, which is usually due to a weak supinator muscle.

Alternate Testing Methods: The test may be accomplished in the seated, standing, or supine position. In the seated or standing position, stabilization is more difficult. In the supine position, the examiner is limited in his ability to observe for failure of scapular fixation by the patient's muscles.

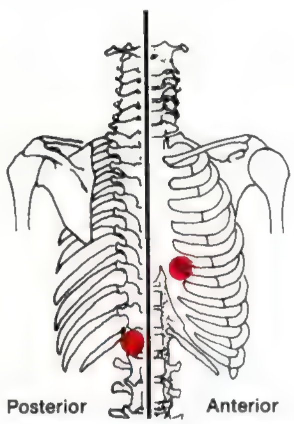
Nerve Supply: Subscapular, **C5, 6**

18—48.



NEUROVASCULAR

STRESS RECEPTOR



NEUROLYMPHATIC

Neurolymphatic:[12]
Anterior: 5th intercostal space near sternum on right.
Posterior: T12 lamina

Neurovascular: Angle of Louis[12]

Nutritional: Thymus concentrate or nucleoprotein extract

Meridian Association: Triple heater (provisional). The alarm point for involvement of the thymus is CV18, located on the sternum just above the alarm point for the circulation sex meridian. This is a point which has been determined clinically in applied kinesiology, and is not one of classic acupuncture.[12]

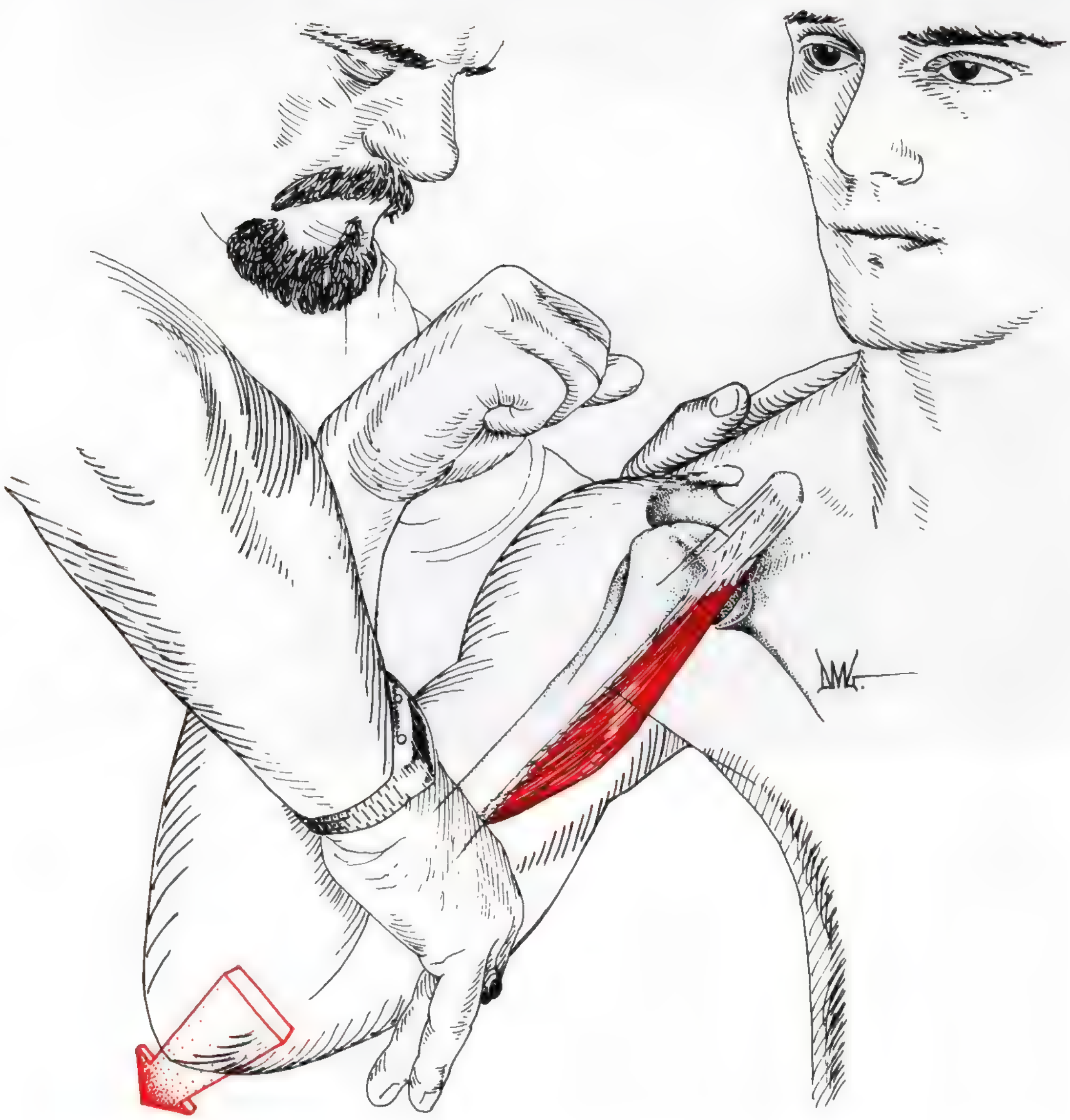
Gland Association: Thymus

General Discussion: There is close synergism between the teres minor and the infraspinatus muscles. A combination of manual muscle testing, along with therapy localization and clinical association with the patient's health problems, is necessary to determine differential diagnosis between these muscles.

The infraspinatus, being one of the rotator cuff muscles, is important in acting as a couple with the deltoid in shoulder abduction. The muscle acts in synergism with the teres minor and subscapularis to stabilize the head of the humerus in the glenoid cavity as the deltoid and supraspinatus abduct the arm. The infraspinatus acts throughout abduction, reaching its peak at 180°. It is also active throughout flexion.[16]

During normal walking and on a treadmill at 15° incline, there was nil or negligible activity of the infraspinatus observed on electromyography.[15]

Coracobrachialis



18—49. Testing pressure is in the direction of the arrow. Elbow is maintained in maximum flexion to help take biceps brachii out of the test.

Origin: Tip of coracoid process of scapula.

Insertion: Middle of medial border of humerus, opposite deltoid tuberosity.

Action: Flexion and adduction of arm.

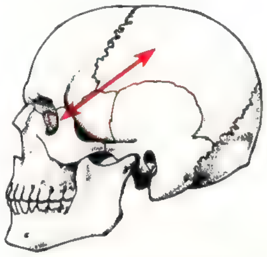
Testing Position: Sitting or supine, the patient flexes the shoulder in slight lateral rotation. Elbow is completely flexed to reduce action of the biceps in the test.

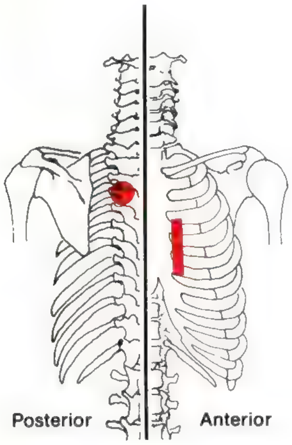
Stabilization: If test is done in seated position, the examiner stabilizes the shoulder posteriorly and slightly laterally.

Synergists: Pectoralis major, biceps brachii, and anterior deltoid.

Test: Pressure is exerted against the distal part of the humerus in direction of extension and slight abduction.

18—50.





Body Language of Weakness:

During test: The patient will adduct the arm stronger in an attempt to recruit synergism of the pectoralis major.

Movement aberrations: Difficulty in placing hand behind head, especially with considerable activity, such as combing the back of the hair.

The coracobrachialis is used in eating. In the presence of its weakness, the patient will complain that "My arm gets tired when I eat."

Nerve Supply: Musculocutaneous, **C6, 7**

Neurolymphatic:

Anterior: 2nd-4th intercostal spaces near sternum
Posterior: Between T3-4 near laminae

Neurovascular: Bregma

Nutritional: Lung concentrate or nucleoprotein extract, vitamin C

Meridian Association: Lung

Organ Association: Lung

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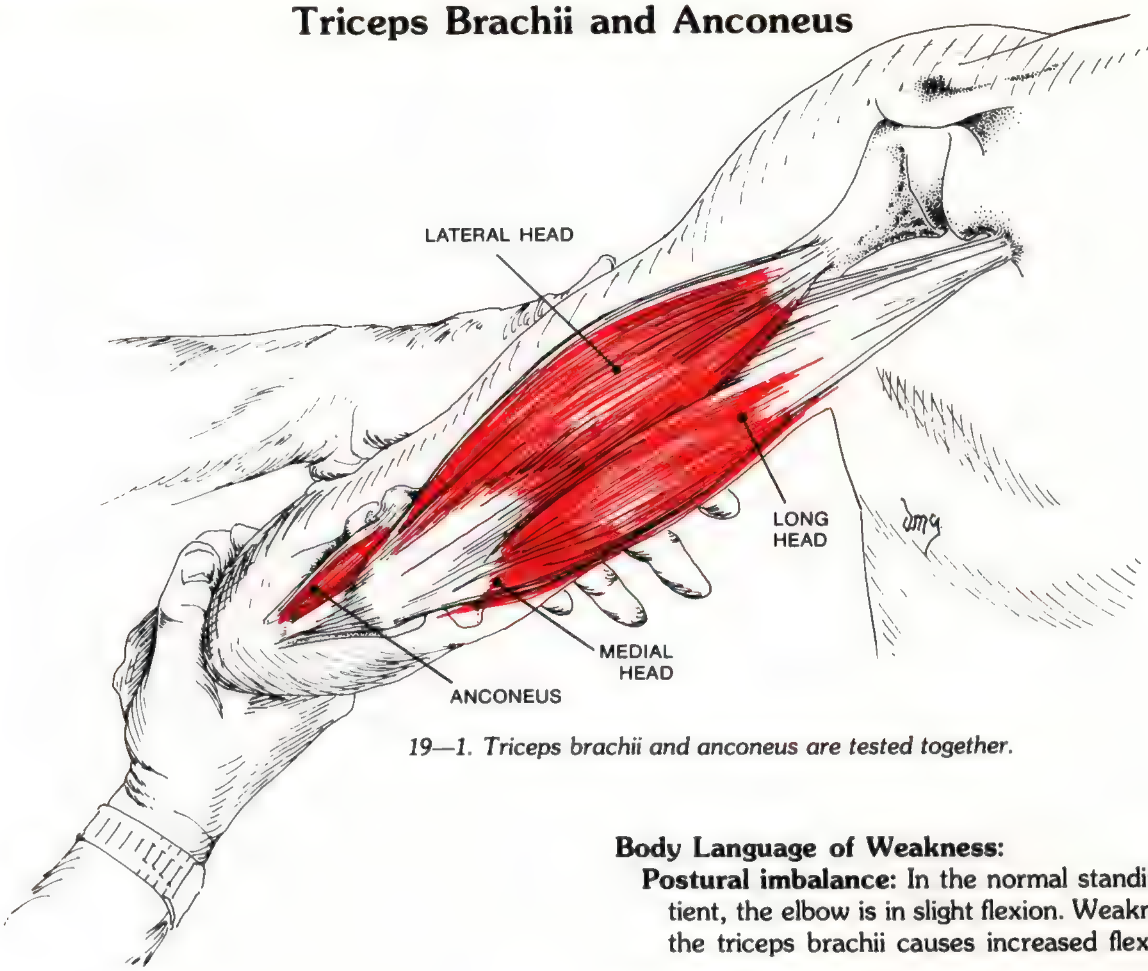
Chapter 19

Arm and Hand Muscles

Triceps Brachii and Anconeus



19—1. Triceps brachii and anconeus are tested together.

TRICEPS BRACHII

Origin:
  Long Head: Infraglenoid tubercle of scapula.
  Lateral Head: Posterior lateral surface of humerus.
  Medial Head: Lower posterior surface of the humerus.

Insertion: Upper posterior surface of the olecranon and deep fascia of the forearm.

Action: Extends forearm. Long head aids in adducting and extending the arm.

Testing Position: Seated, prone, or supine patient abducts or flexes shoulder and flexes elbow to about 45°.

Stabilization: Stabilize humerus.

Synergist: Anconeus

Test: Pressure directed on the wrist to flex elbow.

Body Language of Weakness:
  Postural imbalance: In the normal standing patient, the elbow is in slight flexion. Weakness of the triceps brachii causes increased flexion.

Alternate Testing Methods: Can be tested weight-bearing with same basic principles.

Nerve Supply: Radial, C6, **7**, **8**, T1

Neurolymphatic:
  Anterior: 7th intercostal space on left at rib-cartilage junction.
  Posterior: Between T7-8 at laminae on left.

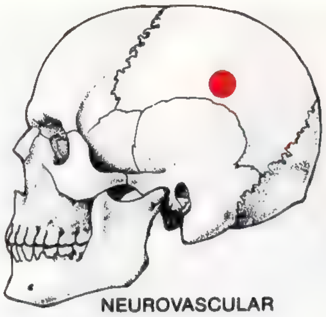
Neurovascular: Superior to temporal bone on a vertical line slightly posterior to external auditory meatus.

Reactive Muscle Correlation: Biceps brachii, supinator.

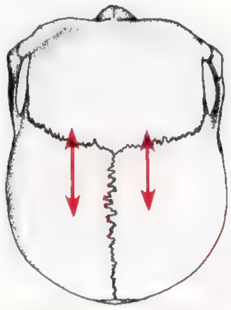
Meridian Association: Spleen

Organ Association: Pancreas

General Discussion: During normal walking on a treadmill at an incline of 15°, there was no activity found in the triceps on electromyographic evaluation.[7] Travill[12] demonstrated no activity of the long head of the triceps during active extension of the elbow. The medial head appears to be the prime extensor, with some aid from the lateral head. Against resistance, all heads of the triceps are active.

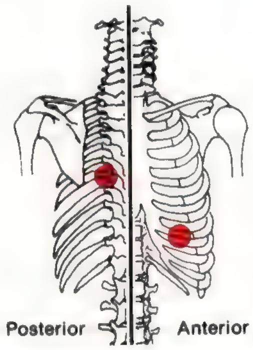


NEUROVASCULAR



STRESS RECEPTOR

19—2.



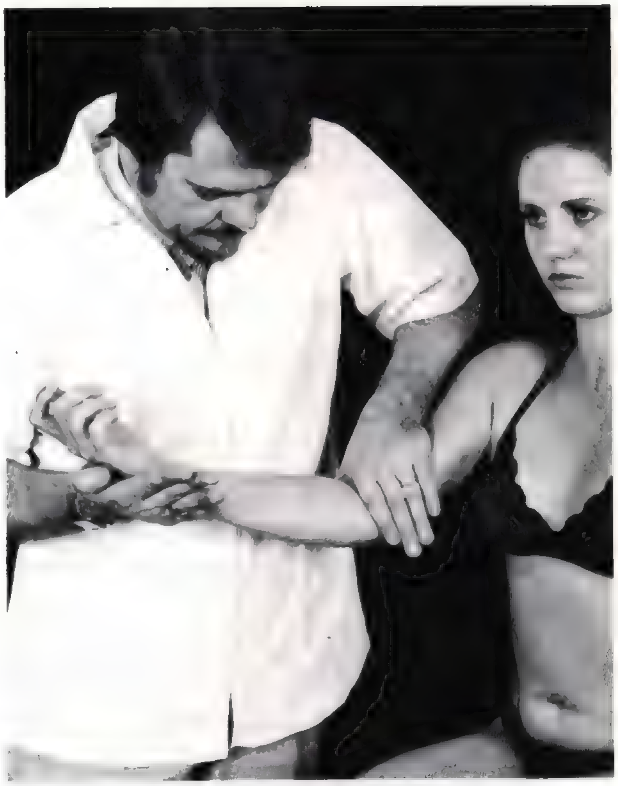
NEUROLYMPHATIC REFLEX
USUALLY ON LEFT ONLY

ANCONEUS

Origin: Posterior surface of lateral epicondyle of humerus.

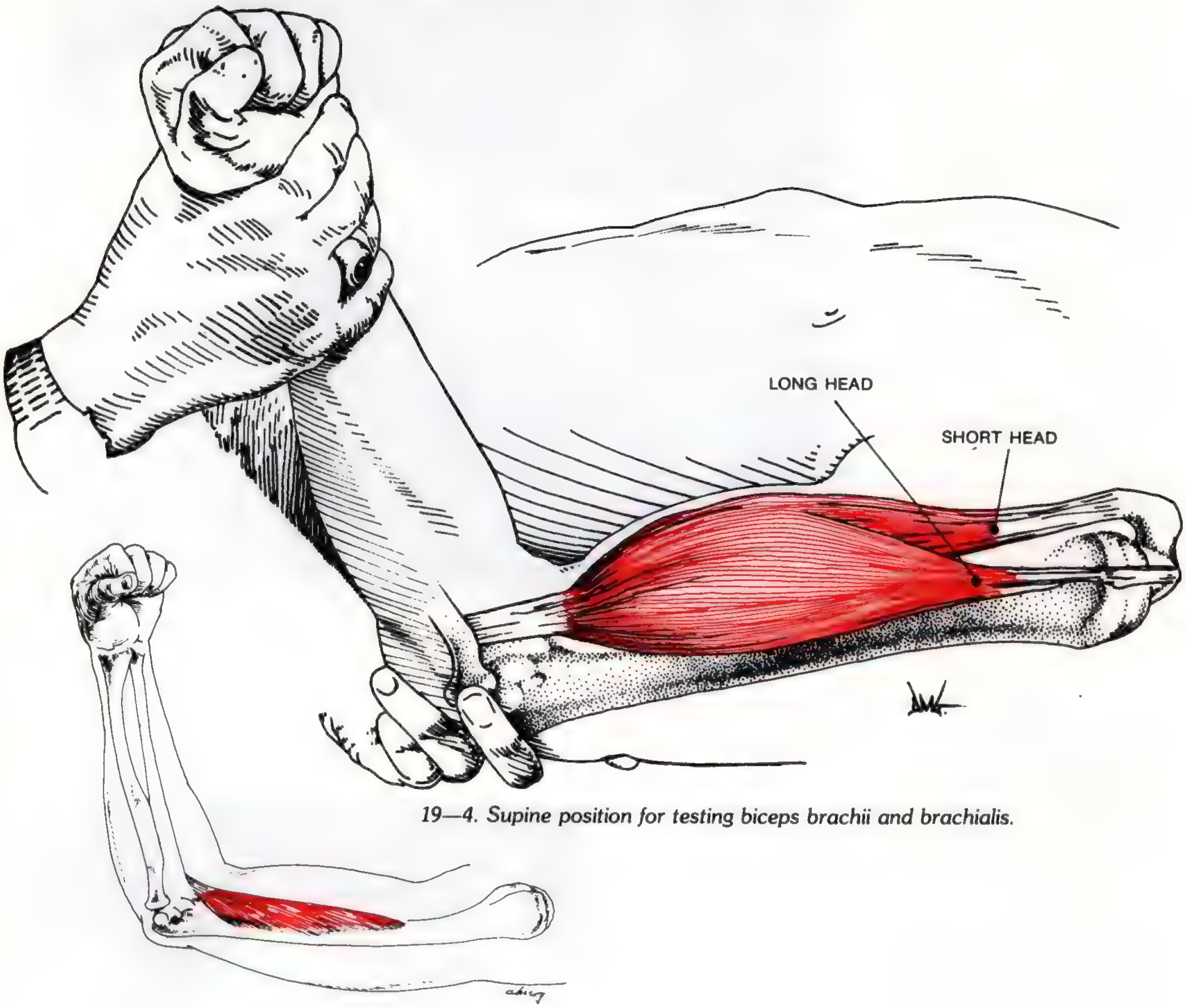
Insertion: Lateral side of olecranon and posterior surface of ulna.

Action: Extends elbow. Ray et al.[10] demonstrated electromyographically that the anconeus is active from the onset of forearm pronation to the fully completed movement. Basmajian and Griffin,[2] using fine wire electrodes, demonstrated the anconeus moderately active during pronation and supination of the forearm, and slightly more than moderately active in extension of the elbow, suggesting the anconeus is active in some form of joint stabilization.



19—3.

Biceps Brachii and Brachialis



19—4. Supine position for testing biceps brachii and brachialis.

19—5. Brachialis

The biceps brachii and the brachialis will be considered together, as they are tested simultaneously.

BICEPS BRACHII

Origin:
Short Head: Tip of coracoid process.
Long Head: Supraglenoid tubercle of the scapula.

Insertion: Tuberosity of the radius and lacertus fibrosus, which is a deep aponeurosis continuous with the deep fascia of the flexor muscles of the forearm.

Action: Flexes the forearm; supinates the forearm only when the motion is resisted.[1] Both heads of the biceps brachii are active during flexion of the shoulder joint, with the long head being more active.[3]

Nerve Supply: Musculocutaneous, **C5, 6**

BRACHIALIS

Origin: Lower 2/3 of the anterior surface of the humerus.

Insertion: Tuberosity and coronoid process of the ulna.

Action: Flexes forearm on humerus.

Nerve Supply: Branch of musculocutaneous, **C5, 6;** usually additional small branch from radial, and occasionally of the median nerve.

19—6.

Testing Position for Biceps Brachii and Brachialis: Sitting patient flexes forearm to approximately 75° at the elbow, with the palm facing up in supination.

Stabilization: Examiner stabilizes under the elbow.

Synergist: Brachioradialis

Test: Pressure is directed against the distal forearm to affect elbow extension.

Body Language of Weakness:
- **During test:** Patient attempts to pronate forearm to recruit synergistic action of brachioradialis.
- **Postural imbalance:** The standing, relaxed patient will fail to have the normal slight elbow flexion. The arm will be held in an extended manner.

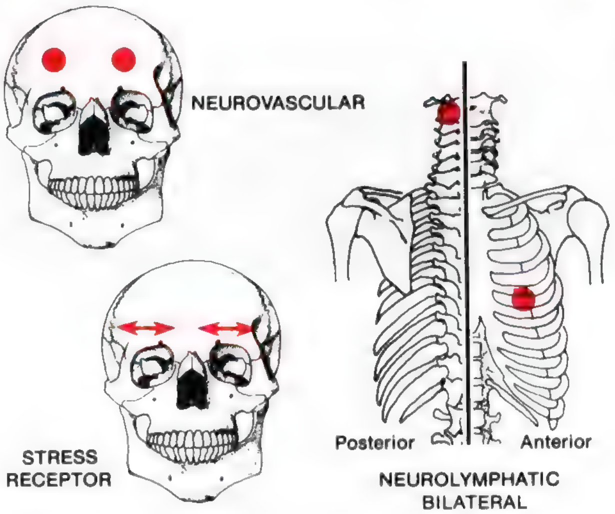
Alternate Testing Methods: May be tested in the prone or supine positon. When tested in the supine position, the elbow can be stabilized against the table, being careful that there is no pain from elbow contact with a hard table.

Neurolymphatic:
- **Anterior:** Intercostal space 4th-5th ribs, 3" from sternum.
- **Posterior:** C2 lamina.

Neurovascular: Bilateral frontal bone eminences.

Reactive Muscle Correlation: Triceps brachii, upper trapezius.

Nutritional: Betaine hydrochloride, duodenal concentrate, chlorophyll complex.



Meridian Association: Stomach

Organ Association: Stomach

General Discussion: During normal walking or walking on a treadmill at a 15° incline, there is no activity of the biceps brachii on electromyography.[7]

In a study of the biceps brachii, brachialis, and brachioradialis, Basmajian and Latif[3] found an unpredictable sequence of functioning in various activities. They concluded that there was a fine interplay between these muscles, stating that "These findings re-emphasize the general biological principle that there is a range of response in any phenomenon. It would seem that anatomists and clinicians have taken too little heed of this wide range of individual pattern of activity in something even so simple as elbow flexion."[1]

Brachioradialis

Origin: Proximal 2/3 of the lateral supracondylar ridge of humerus and lateral intermuscular septum.

Insertion: Lateral side of base of styloid process of radius.

Action: Flexes elbow and is exceptionally active on quick bursts of activity. It has been considered that the brachioradialis gives some aid in pronation and supination from the extreme rotated position to the mid position when acting against resistance. In movement without resistance, there is no activity in pronation and supination as observed on electromyography.[1] DeSousa et al.,[4] using needle electrodes, demonstrated no activity of the brachioradialis in supination or pronation during free and loaded activity of the extended or 90°-flexed forearm.

Testing Position: Sitting patient flexes elbow with the forearm to approximately 75°. The hand position is neutral between supination and pronation (thumb up position).

Stabilization: Examiner stabilizes under the elbow.

Synergists: Brachialis, biceps brachii.

Test: Pressure is directed against the lower forearm in direction of extension. Brachioradialis belly should be observed for its contraction because of other muscle recruitment.

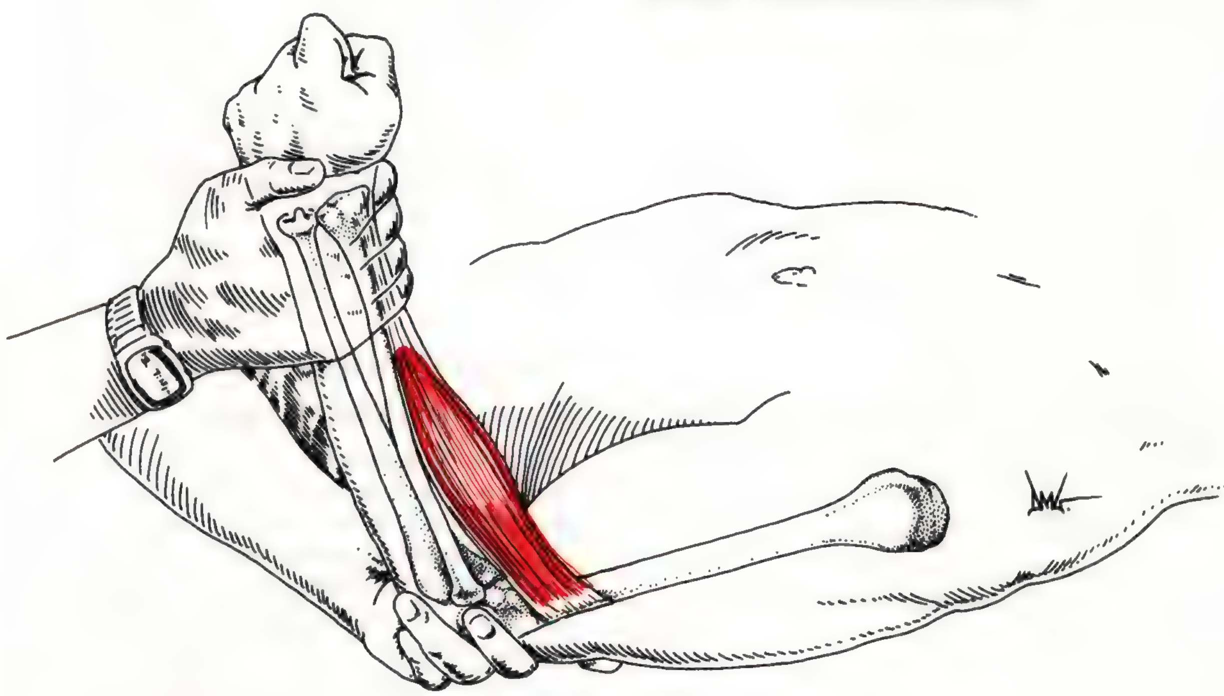
Body Language of Weakness:
- **During test:** Patient attempts to supinate forearm to bring biceps brachii more favorably into synergistic action.
- **Movement aberrations:** Patient has difficulty in getting arm up behind back, such as when fastening a bra.
- **Postural imbalances:** Decrease of the slight normal elbow flexion in standing position.

Alternate Testing Methods: Test can be accomplished in the prone or supine position. In the supine position, the examiner should take care that the elbow is not uncomfortable against a hard table surface.

Nerve Supply: Radial, **C5, 6**

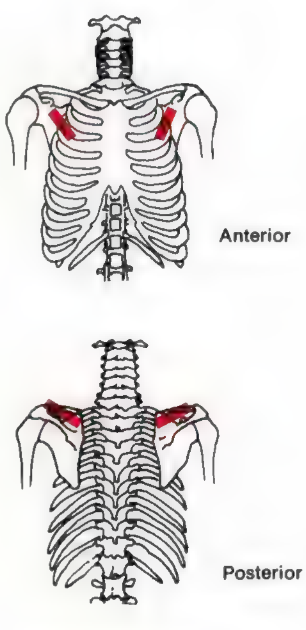
Neurolymphatic:
- **Anterior:** Over entire pectoralis major, with emphasis over pectoralis minor.
- **Posterior:** Over origin of the supraspinatus.

Meridian Association: Stomach



19—7. Brachioradialis test.

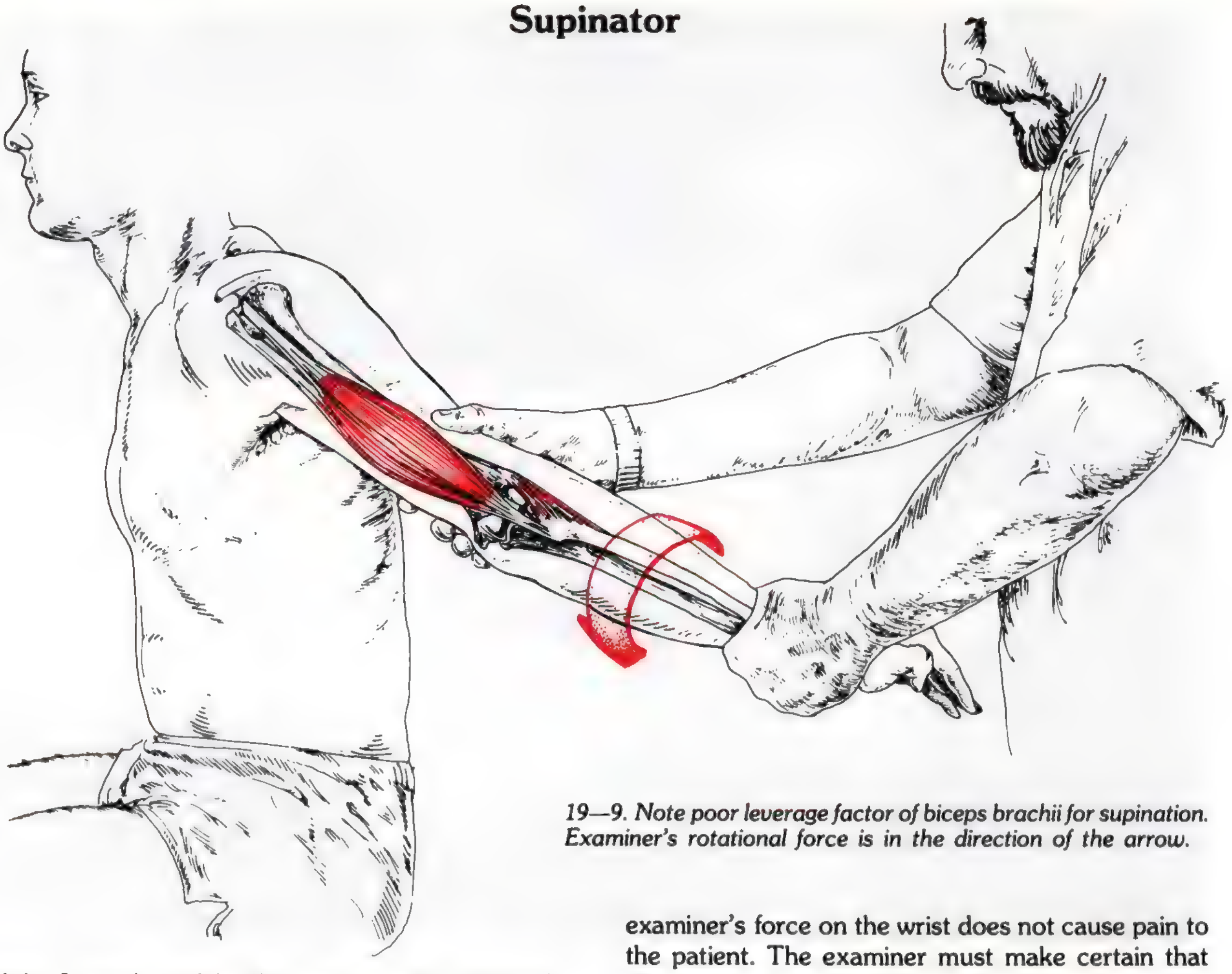
19—8.



General Discussion: This muscle weakness and lymphatic involvement are frequently found on an empiric basis in conditions of insomnia and general nervous tension.

It appears that the neutral position of the forearm (thumb up) is ideal for testing the brachioradialis. The position morphologically aligns the origin and insertion of the muscle. Basmajian[1] relates that Beevor, in the very early 20th century, stated that if the forearm is in supination, the biceps acts during flexion when there is a resistance of as little as four ounces, but that in a position of complete pronation, it does not act until the resistance is at least four pounds. This has been confirmed by Basmajian et al. in electromyographic studies. He goes on to relate that further evidence has been provided by Bankov and Jorgenson, who demonstrated that strength of the elbow flexors is less in the pronated than the supinated forearm, and integrated electromyographic response of the biceps is considerably reduced in the pronated forearm.

Supinator



19—9. Note poor leverage factor of biceps brachii for supination. Examiner's rotational force is in the direction of the arrow.

Origin: Lateral condyle of humerus, radial collateral ligament of elbow, annular ligament of radius, and supinator crest of ulna.

Insertion: Lateral anterior surface of radius on upper 1/3.

Action: Supinates forearm.

Testing Position: The testing position is designed to put the synergistic biceps brachii to as much disadvantage as possible. The elbow is maintained in an extension position, and the shoulder is extended close to the maximum amount. This elongates the biceps brachii and morphologically places it at a disadvantage for supination.

Patient Fixation Requirements: The humeral head must be fixed in the glenoid cavity to avoid rotation at this articulation.

Stabilization: The examiner stabilizes the upper arm so there is no rotation of the humerus.

Synergist: Biceps brachii

Test: Force is directed above the wrist in the direction of pronation. Care should be taken that the examiner's force on the wrist does not cause pain to the patient. The examiner must make certain that the patient does not rotate the humerus as the supinator goes from isometric to eccentric contraction.

Body Language of Weakness:

During test: Patient allows humeral head to rotate in glenoid cavity.

Postural imbalances: Hand facing into pronation (palm posterior) without internal rotation of the humerus. This can be confused with a weak teres minor and/or infraspinatus.

Alternate Testing Methods: With the patient in a supine position, the arm is placed in a position to shorten the biceps to the maximum amount. The shoulder is flexed to 90° with maximum flexion of the elbow. The examiner supports the elbow and directs rotation to the forearm in the direction of pronation just above the wrist. Again, care should be taken that the examiner's pressure above the wrist does not cause pain to the patient. This is an improved testing position if adequate stabilization cannot be maintained to prevent rotation of the head of the humerus at the glenoid cavity (19—11).

Nerve Supply: Radial, C5, **6**

Neurolymphatic:
Anterior: 6th intercostal space from mammillary line to sternum on left.
Posterior: Between T6-7 near laminae on left. (Note: may also be involved with the neurolymphatic for the adductors.)

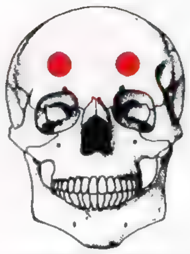
Neurovascular: Bilateral frontal bone eminence.

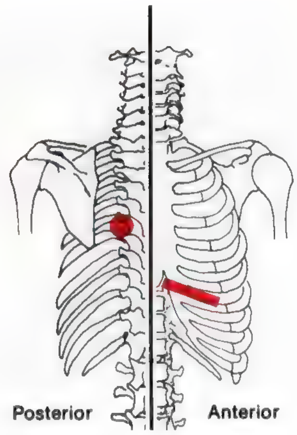
Reactive Muscle Correlation: Triceps

Nutritional: Vitamins B, G, and HCl

Meridian Association: Stomach

Organ Association: Stomach

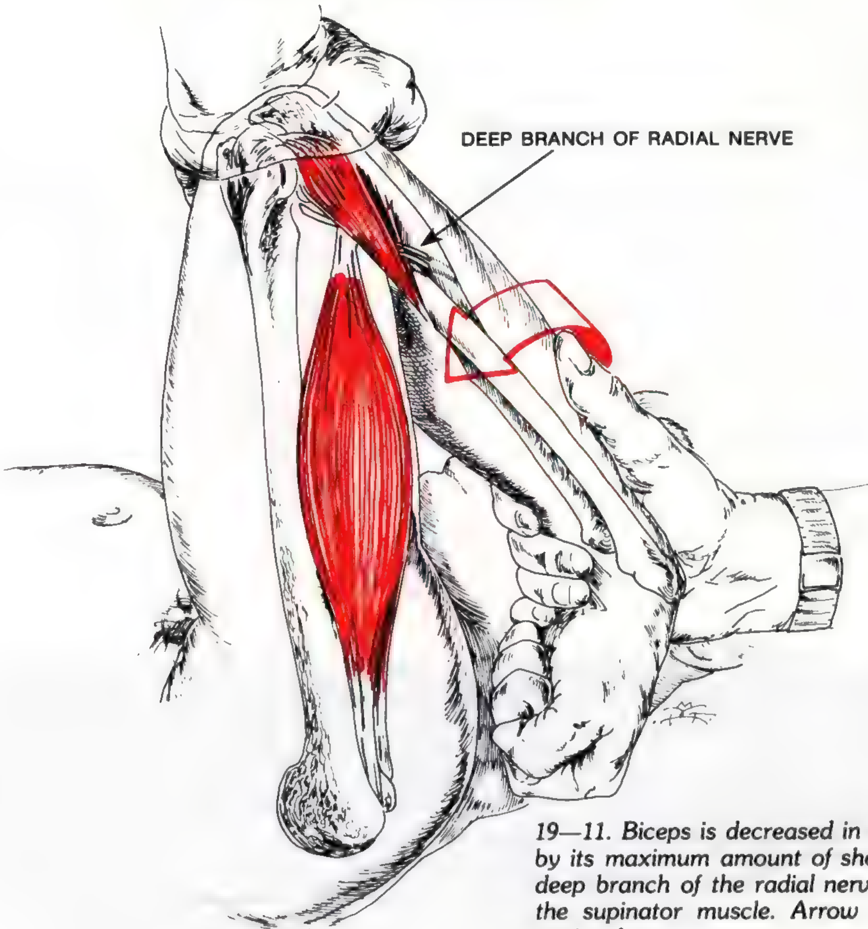

NEUROVASCULAR



NEUROLYMPHATIC REFLEX USUALLY ON LEFT ONLY

19—10.

Supinator (continued)



19—11. Biceps is decreased in supinating activity by its maximum amount of shortening. Note the deep branch of the radial nerve passing through the supinator muscle. Arrow is in direction of testing force.

19—12.

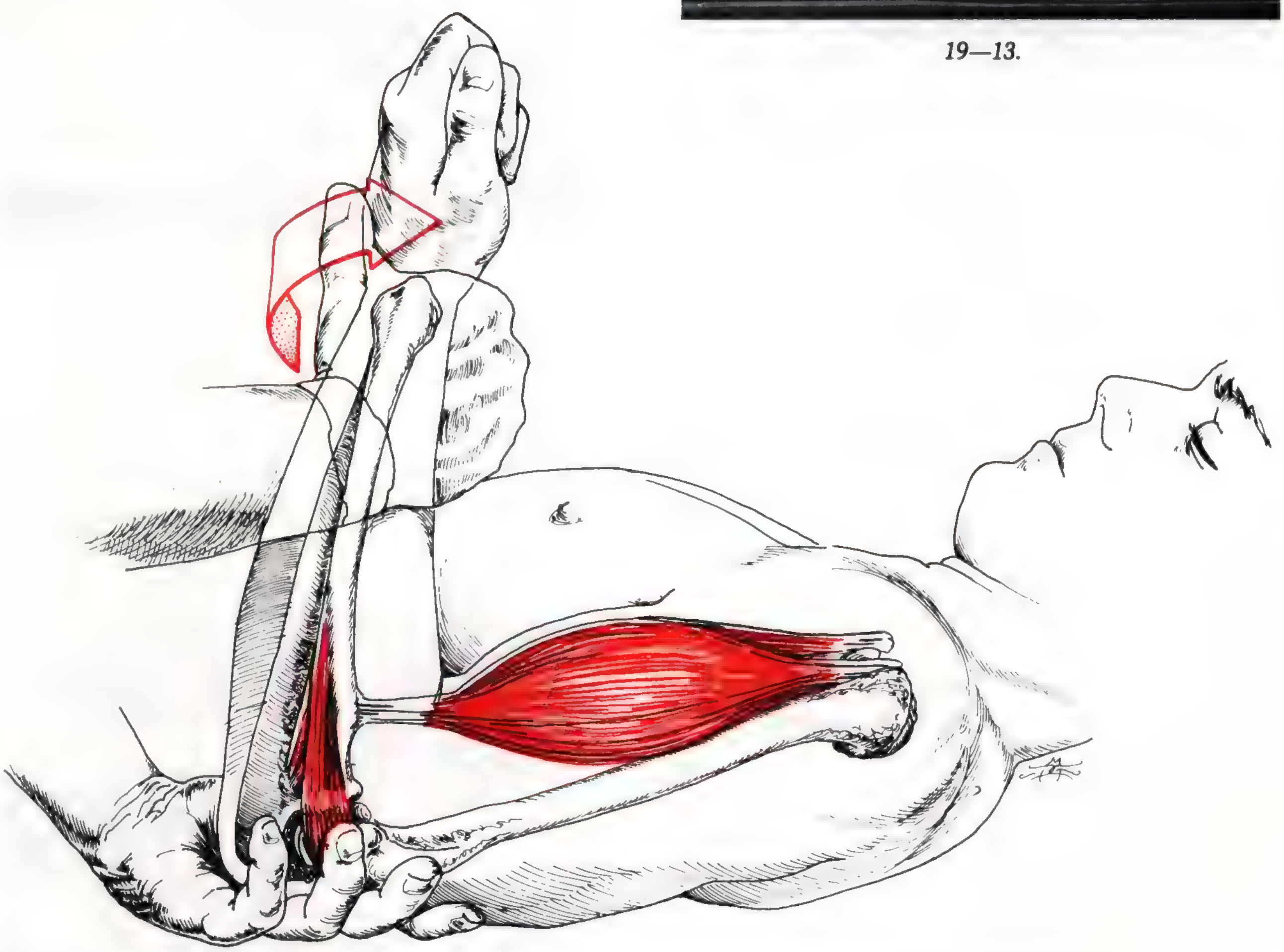
General Discussion: The supinator muscle is sometimes involved with a nerve entrapment of the deep branch of the radial nerve as it passes through the muscle.[8, 9] This involvement can cause referred pain into the radial nerve distribution of forearm and hand, or to the shoulder.

In the absence of a tumor or some other space-occupying lesion, applied kinesiology techniques obtain excellent clinical results with this and other peripheral nerve entrapment syndromes. The usual approach is to evaluate the muscular balance in the area and, using usual AK techniques, return normal function (see Volume IV for details).

Travill and Basmajian[11] studied with electromyography the relative supinating action of the forearm by the supinator and biceps brachii muscles. The study was done with the elbow extended, and with the elbow flexed to 90°. The prime mover of forearm supination was found to be the supinator muscle and not the biceps brachii, although it was active in supination in nearly all instances. It seems that the test of the supinator with the arm extended is the optimum method to best isolate the supinator muscle.

Supinator and Biceps Brachii

19—13.



19—14. Biceps brachii and supinator are both active in this test. Examiner's force is in the direction of the arrow.

Pronator Teres

Origin:

Humeral head: from the medial epicondylar ridge and common flexion tendon.

Ulnar head: from medial side of coronoid process of ulna.

Insertion: Middle of lateral surface of radius.

Action: Pronates forearm and is significant in flexing the elbow.[11]

Testing Position: With the patient supine, the elbow is held to the side of the body and flexed to 60°. The forearm is held in pronation.

Stabilization: The humerus should be stabilized to the patient's side to avoid shoulder abduction.

Synergists: This test is of both the pronator teres and the pronator quadratus. To obtain differential information about the pronator teres, the pronator quadratus test must be compared. The pronator quadratus test is of pronation capability when the elbow is flexed, apparently placing the synergistic action of the pronator teres at a disadvantage.

Test: Force is directed to the forearm just above the wrist in a direction of supination. The examiner must take care that the force applied does not cause pain at the contact point.

Body Language of Weakness:

During test: Patient attempts to abduct the humerus or to flex or extend the elbow, placing different activities into the test.

Movement aberrations: Patient complains of difficulty in doing common daily activities (turning a doorknob, picking up a cup, etc.).

Postural imbalances: In the postural position, the hand faces into supination (palm facing more toward anterior) without external rotation of the humerus.

Nerve Supply: Median, **C6, 7**

Neurolymphatic:

Anterior: behind areola

Posterior: below inferior angle of scapula.

Neurovascular (provisional): On lambdoidal suture midway between lambda and asterion.

Meridian Association: Stomach

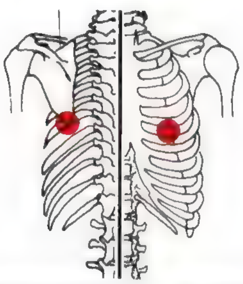
Organ Association: Stomach

General Discussion: Basmajian and Travill[11] studied the activity of the pronator quadratus and the pronator teres in forearm pronation with concentric needle electrode electromyography. The muscles were studied with the subjects supine and the upper arm resting on the table top; the forearm was (a) extended, (b) flexed to 90°, and (c) flexed to an acute angle. The muscles were tested in fast pronation, holding pronation, slow supination, and fast supination. It was consistently found that the pronator quadratus is the prime pronator muscle, and the teres is the auxillary which reinforces fast pronation or pronation against resistance. The amount of activity of the pronator teres is not influenced by the position of the elbow. They further found that when the subject is seated, there is nil activity of the pronator teres when the subject flexes the elbow from the hanging position.

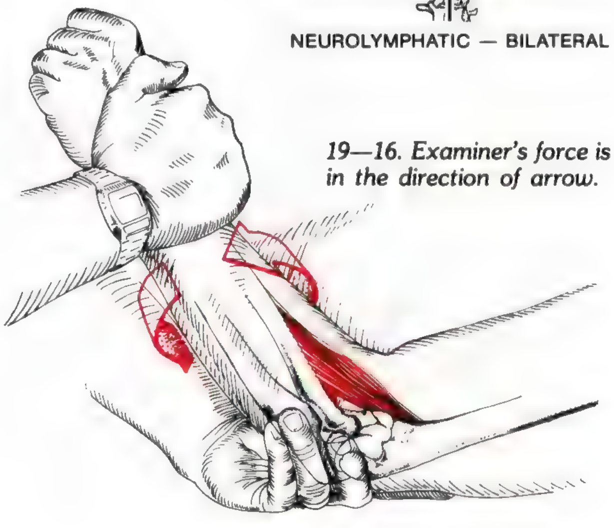
Very frequently when the pronator teres is found to be weak, origin/insertion technique is needed, as well as proprioceptive technique to the Golgi tendon organ and muscle spindle cell.

19—15.

NEUROVASCULAR

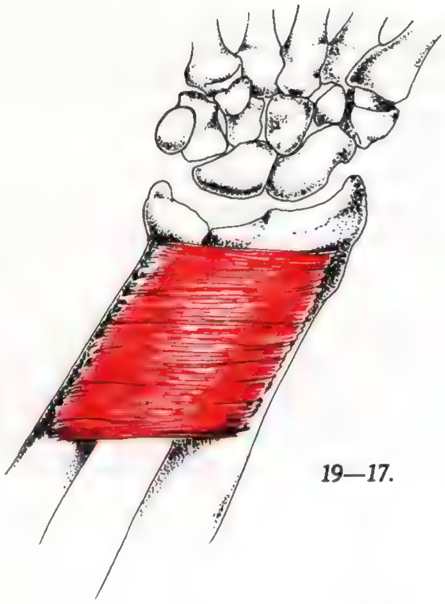


NEUROLYMPHATIC — BILATERAL

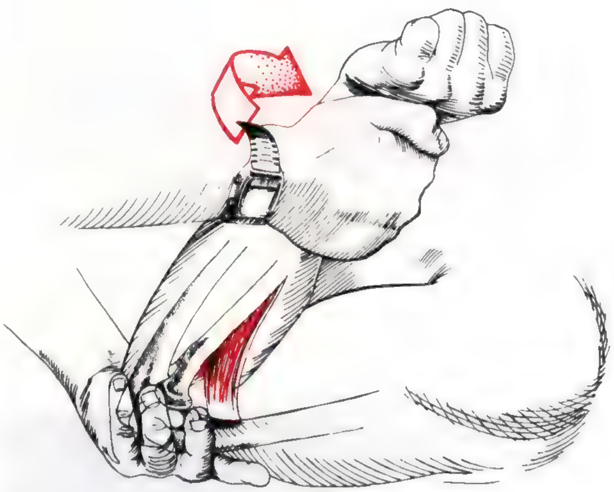


19—16. Examiner's force is in the direction of arrow.

Pronator Quadratus



19—17.



19—18. This testing position for pronating strength reduces the activity of the pronator teres by shortening it and putting it at a mechanical disadvantage. The pronator quadratus is not shown in this test. The examiner's testing force is in the direction of the arrow.

19—19.

Origin: Distal 1/4 of the volar surface of ulna.

Insertion: Distal 1/4 of the lateral border, volar surface of the radius.

Action: Pronates the forearm.

Testing Position: Patient sitting or supine flexes elbow completely and places the wrist in pronation with the elbow held against the side of the body.

Patient Fixation Requirement: The upper arm must be fixed to the side of the body.

Stabilization: The examiner stabilizes the elbow, assuring that there is no movement of the upper arm.

Synergists: The pronator teres is at the maximum state of shortening in the elbow-flexed arm-pronated position. Movement from pronation to supination in this position appears to have considerably less pronator teres activity than pronator quadratus. A comparison between the test with the elbow flexed to 60°, which evaluates both the pronator teres and the pronator quadratus, and the elbow completely flexed test, which places the pronator teres at disadvantage, must be made to evaluate the two muscles.

Body Language of Weakness:

During test: Occasionally the patient will try to change the arm position. This is done more as a frustration of weakness than an attempt to recruit synergistic muscles.

Movement aberrations: Difficulty in turning a doorknob, tilting a cup or a glass to the lips, and other pronating motions.

Postural imbalances: Palm of hand rotated slightly toward anterior, with no rotation of the humerus. Do not confuse with total arm rotation, such as is observed in the presence of a weak subscapularis and/or teres major.

Nerve Supply: Median, C7, **8, T1**

General Discussion: Integrity of the pronator quadratus is important in the carpal tunnel syndrome. Separation of the distal end of the radius and the ulna stretches the flexor retinaculum, causing a nerve entrapment of the median nerve.[6] (See Volume IV for details.)

This muscle is very difficult to directly test for weakness. The weakness observed on muscle testing can be confirmed by therapy localization to the origin and insertion of the muscle, or to different areas in the muscle belly for proprioceptive involvement. The examiner can usually palpate the areas of origin and insertion to locate what appear to be Golgi tendon organs which need treatment.

During pronation of the forearm, the pronator quadratus is the prime pronator muscle. The pronator teres is also active, but on a secondary basis.[11]

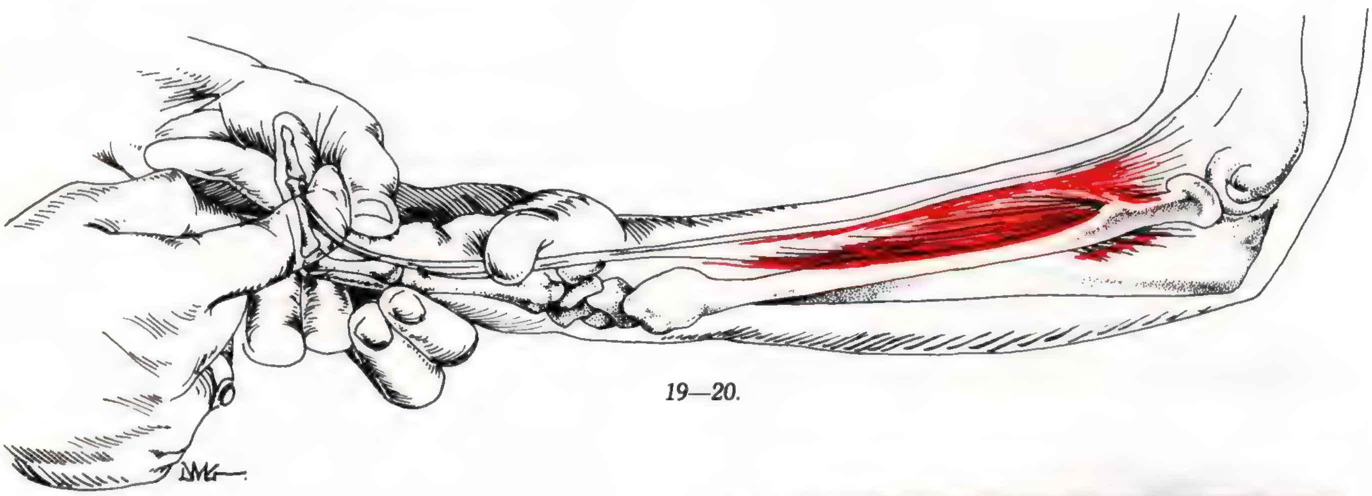
Flexor Digitorum Superficialis

Origin:

Humero-ulnar head: medial epicondyle of the humerus by the common tendon, ulnar collateral ligament of the elbow joint and from the coronoid process of the ulna.

Radial head: oblique line of the radius from the radial tuberosity to the insertion of the pronator teres.

Insertion: Superficial tendons to the middle and ring fingers. They are inserted by two slips on the sides of the 2nd phalanx about the middle. At the level of the 1st phalanx, the tendon divides for the passage of the tendon of the flexor digitorum profundus. In a similar manner, the deep tendons insert into the 2nd and 5th digits.



19—20.

Action: Flexes the 2nd phalanx of each finger on the proximal phalanx. Continued action, flexes the 1st phalanx, wrist, and elbow.

Testing Position: The wrist is held in neutral position, the metacarpophalangeal and the distal interphalangeal articulations kept in extension. The proximal interphalangeal articulation is flexed.

Patient Fixation Requirement: Maintain distal interphalangeal articulation in extension.

Stabilization: The examiner stabilizes the hand and metacarpophalangeal articulation of digit being tested.

Synergist: Flexor digitorum profundus

Test: Pressure is directed against the palmar surface of the middle phalanx in the direction of extension.

Body Language of Weakness:

Testing Position: Inability to flex the proximal interphalangeal articulation without significant flexion of the distal interphalangeal articulation.

During test: Attempt by the patient to flex metacarpocarpal articulation or distal interphalangeal articulation.

Movement aberrations: Difficulty in flexion-type activity of the fingers, such as any intricate motion, machine operation; playing musical instruments is difficult.

Nerve Supply: Median, **C7, 8, T1**

General Discussion: Weakness of the flexor digitorum superficialis is most commonly due to proprioceptive involvement or the need for origin/insertion technique. The median nerve supply to this muscle is not correlative to carpal tunnel syndrome since the muscle receives its nerve supply prior to the carpal tunnel. The selective use of different sections of this muscle is obvious because of the ability to keep one finger flexed strongly at the proximal middle interphalangeal articulation while the rest of the fingers function. There will commonly be poor function of the flexor digitorum superficialis at the little finger.

19—21.

Flexor Digitorum Profundus

Origin: Upper 3/4 of the anterior and medial surfaces of the ulna; interosseous membrane and deep fascia of the forearm.

Insertion: Base of the distal phalanges on the palmar surface of the 2nd-5th digits.

Action: Flexes the distal phalanges of the four fingers, synergistic to flexion of the proximal interphalangeal articulation.

Testing Position: Wrist in neutral position; metacarpophalangeal and proximal interphalangeal articulations in neutral or extended position.

Patient Fixation Requirements: Fixation of wrist from flexion or extension.

Stabilization: Examiner stabilizes hand in testing position, paying particular attention to the proximal and middle phalanx.

Synergists: None

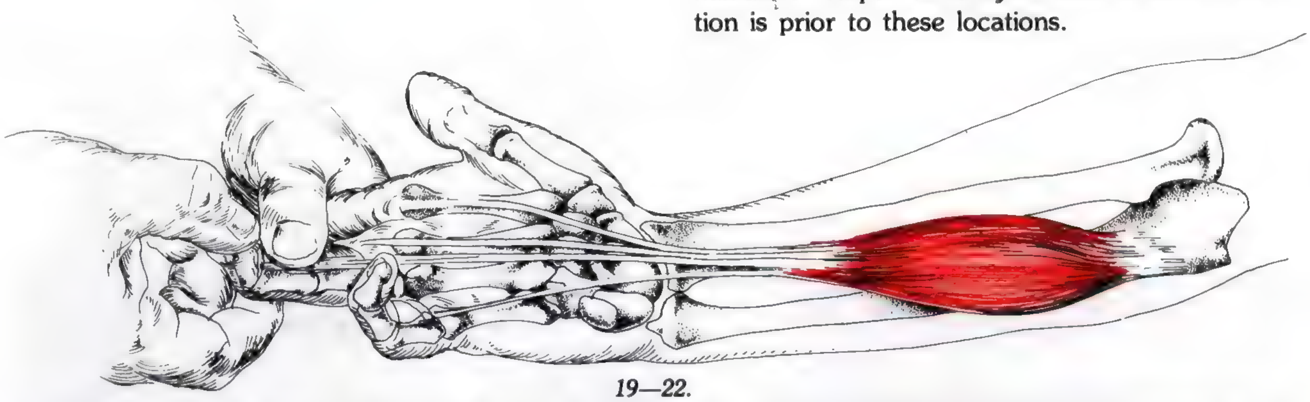
Test: Pressure is directed against palmar surface of distal phalanx in direction of extension. The amount of strength exhibited is the amount of strength of the muscle, as there are no synergists to this action.

Body Language of Weakness:

- **Testing position:** Inability of patient to place finger into testing position.
- **During test:** Attempts to rotate or flex wrist or attempts to flex metacarpophalangeal or proximal phalangeal articulation.
- **Movement aberrations:** Intricate finger functions cannot be performed efficiently, specifically actions which require flexion of the distal interphalangeal articulation, such as picking certain string instruments, etc.
- **Postural imbalances:** Extension of distal interphalangeal articulation.

Nerve Supply: Nerve to portion of muscle which correlates with index and middle fingers, median, C7, **8, T1**; nerve to portion of muscle which correlates with ring and little fingers, ulnar, C7, **8, T1**.

General Discussion: Involvement of the muscle often requires origin/insertion technique or treatment to the muscle proprioceptors. A trigger-finger condition is usually due to a roughened, nodular area on the tendon as it passes through the tendon of the flexor digitorum superficialis. Innervation by the median or ulnar nerve has no bearing on the pisiform hamate or carpal tunnel syndrome because innervation is prior to these locations.



19—22.

19—23.

Opponens Pollicis

Origin: Flexor retinaculum and tubercle of trapezium bone.

Insertion: Radial side of entire length of first metacarpal bone.

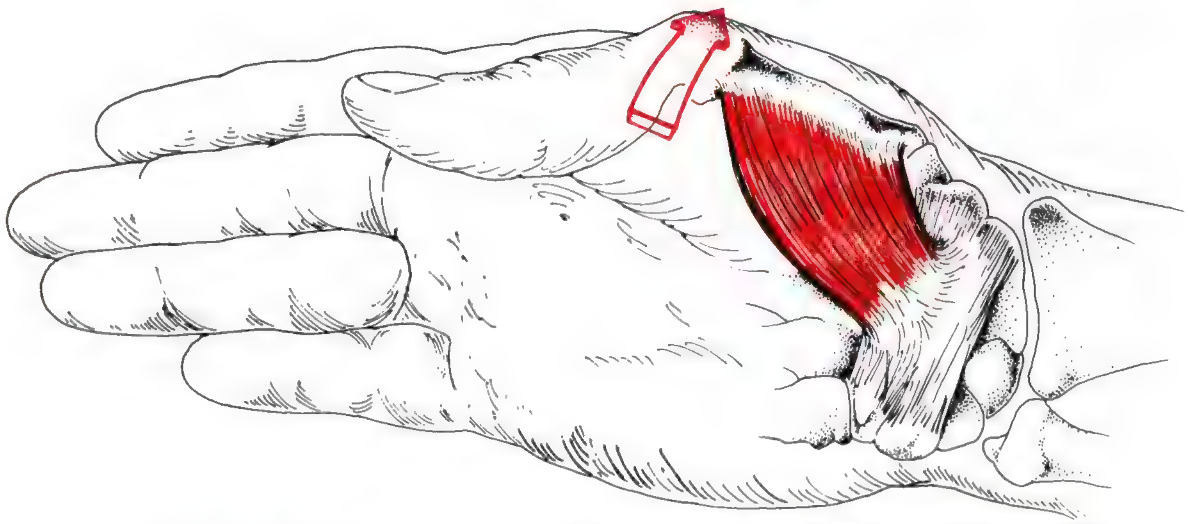
Action: Flexes and abducts the first metacarpal with slight medial rotation. Abduction means to move the metacarpophalangeal articulation away from the palm.

Testing Position: The seated patient brings the first metacarpal into flexion, abduction, and slight medial rotation. The metacarpophalangeal articulation should be kept in extension.

Stabilization: The examiner must stabilize the palm of the hand and the wrist, giving a stable base for the opponens pollicis muscle.

Synergists: The adductor pollicis inserts partly into the base of the proximal phalanx of the thumb. If this muscle is a major activator in the test, there will be an attempt at flexion at the metacarpophalangeal articulation. The abductor pollicis aids in bringing the metacarpophalangeal articulation away from the palm and may also be a synergist in this test.

Test: Pressure is applied against the distal end of the 1st metacarpal in a direction of extension, adduction, and lateral rotation.



19—24. Testing pressure is in direction of arrow to adduct, extend, and laterally rotate the 1st metacarpal. Illustration shows excessive flexion of metacarpophalangeal articulation from recruitment of the adductor pollicis (see 19—27).

19—25.

Body Language of Weakness:

Testing position: The patient with a weak opponens pollicis will be unable to bring the 1st metacarpal into the testing position without flexion of the metacarpophalangeal articulation. Recruiting the adductor pollicis with the flexor pollicis brevis to bring the 1st metacarpal into the testing position causes flexion of the metacarpophalangeal articulation. With flexion of the interphalangeal articulation, the flexor pollicis longus is brought more into the test.

During test: Attempts to flex the metacarpophalangeal and interphalangeal articulations.

Movement aberrations: Patient will complain of difficulty in turning a doorknob, taking lids off jars, handling a coffee cup, and other intricate — as well as strength-requiring — tasks.

Structural imbalance: Chronic involvement can show atrophy of opponens pollicis muscle.

Alternate Testing Methods: Sometimes tested by evaluating the ability to hold the thumb and little finger together. Lack of stabilization makes it very difficult — if not impossible — to determine which of the digital muscles is weak when the patient is incapable of holding the test position against resistance. Evaluation of the involved muscle is important in evaluating the carpal tunnel syndrome or other cause of the lack of integrity.

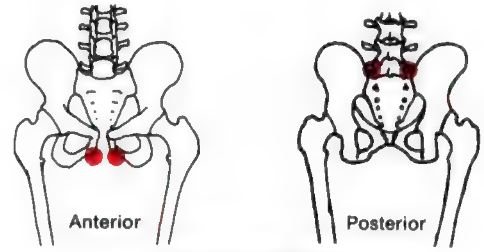
Nerve Supply: Median, **C6, 7**

Neurolymphatic (provisional):

Anterior: inferior to the symphysis pubis at the height of the obturator (same as peroneus longus and brevis).

Posterior: between posterior superior iliac spine and L5 spinous.

Neurovascular (provisional): bilateral frontal bone eminence.



NEUROLYMPHATIC

NEUROVASCULAR

Nutritional: Raw bone concentrate or nucleoprotein extract when the origin and insertion or proprioceptors are involved, either directly with the muscle or with the carpal tunnel syndrome.

Meridian Association: Stomach

Organ Association (provisional): Stomach

General Discussion: Evaluation of the opponens pollicis muscle is very important in evaluating the carpal tunnel syndrome or pisiform hamate syndrome. The carpal tunnel syndrome causes entrapment of the median nerve, whereas the pisiform hamate syndrome causes entrapment of the ulnar nerve. The opponens pollicis muscle is innervated by the median nerve; its synergists — the flexor pollicis brevis and adductor pollicis — are innervated by the ulnar nerve. In a morphological study of 45 hands, Forrest and Khan[5] found that the flexor pollicis brevis and the adductor pollicis each have two specific divisions. A follow-through electromyographic study, using bipolar fine-wire electrodes, revealed distinctive function of these closely adjacent muscles. When evaluating the carpal tunnel syndrome with manual muscle testing, it is necessary to obtain differential diagnosis regarding the strength of some of the intrinsic muscles of the hand.

19—26. If this general test is used, the examiner must watch very closely to determine which muscle is weak. The test has most value as a screening procedure.

Adductor Pollicis

Origin:

Oblique head: capitate bone, bases of the 2nd and 3rd metacarpal bones.

Transverse head: distal 2/3 of the palmar surface of the 3rd metacarpal bone.

Insertion: The two heads converge to insert on the ulnar side of the base of the proximal phalanx of the thumb.

Action: Approximates the thumb to the palm of the hand, which is adduction. Assists in flexion of the metacarpophalangeal articulation. The 1st metacarpal is adducted toward the 3rd metacarpal.

Patient Fixation Requirements: A strong opponens pollicis helps bring the 1st metacarpal into testing position and gives good fixation.

Stabilization: The examiner stabilizes the hand, making certain that the 3rd metacarpal receives stabilization.

Synergists: Flexor pollicis brevis and opponens pollicis.

Test: Pressure is directed against the thumb in a direction to abduct it from the palm.

Body Language of Weakness:

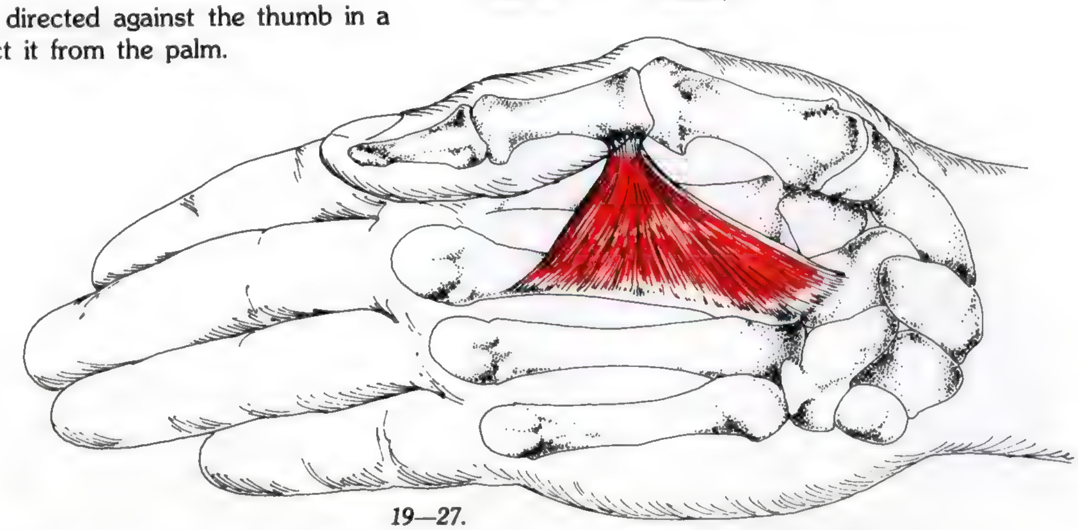
Testing position: Good function of the opponens pollicis will bring the digit close to the testing position; however, there will be an inability to effectively adduct the metacarpophalangeal articulation toward the 3rd metacarpal.

During test: If good stabilization is not provided by the examiner, the patient may change the hand position to recruit synergistic action of other muscles.

Functional problems: Difficulty or inability to hold a piece of paper between the thumb and 2nd metacarpal.

Nerve Supply: Ulnar, **C8, T1**

General Discussion: The adductor pollicis and the opponens pollicis have synergistic action of bringing the thumb into position to oppose the little finger. Differential diagnosis of the strength of these two muscles is important in evaluating which nerve is involved, to differentiate conditions such as carpal tunnel syndrome and pisiform hamate syndrome (see Volume IV for details).

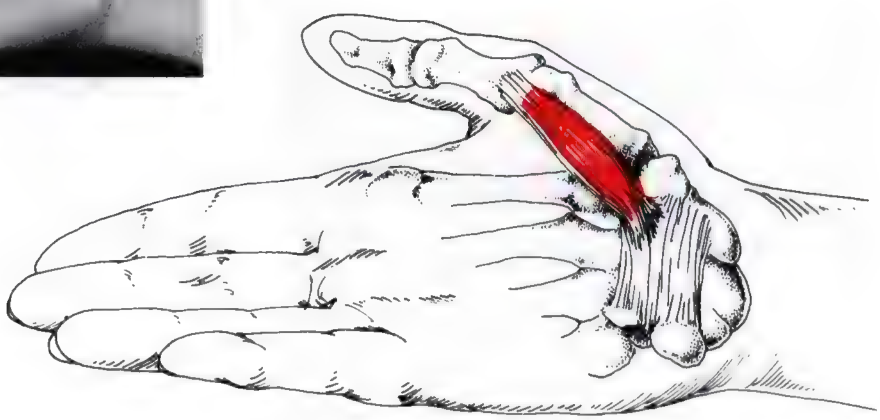


19—27.

19—28.

Flexor Pollicis Brevis

19—29.



19—30.

Origin:

Superficial head: distal border of the flexor retinaculum, lower part of the tubercle of the trapezium bone.

Deep head: trapezoid and capitate bones.

Insertion: Base of proximal phalanx of thumb.

Action: Flexes proximal phalanx of the thumb. Continuing to act, flexes the 1st metacarpal and rotates it medially.

Testing Position: Seated patient with flexion of the 1st metacarpophalangeal articulation, interphalangeal articulation in extension.

Stabilization: The examiner stabilizes the 1st metacarpal and hand.

Synergist: Flexor pollicis longus

Test: Pressure directed against the palmar surface of the proximal phalanx in the direction of extension.

Body Language of Weakness:

Testing position: Inability to flex the metacarpophalangeal articulation without flexion of the interphalangeal articulation.

During test: Inability to perform test without extreme flexion of the distal phalanx. Some patients with good muscle control can perform the test by recruiting the flexor pollicis longus and still maintain the thumb in extension by also recruiting the extensor pollicis longus. The extensor pollicis longus can be palpated for muscle contraction and tendon tension.

Movement aberrations: Difficulty in doing discrete movements requiring opposition and function between thumb and fingers. Difficulty in holding the handle of a coffee cup, etc.

Postural imbalances: Extension of the metacarpophalangeal articulation.

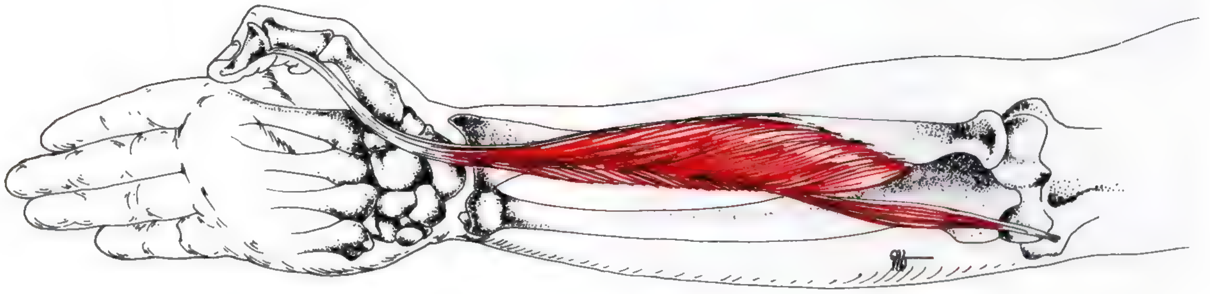
Nerve Supply:

Superficial head: Median, **C6, 7,** 8, T1.

Deep head: Ulnar, **C8, T1.**

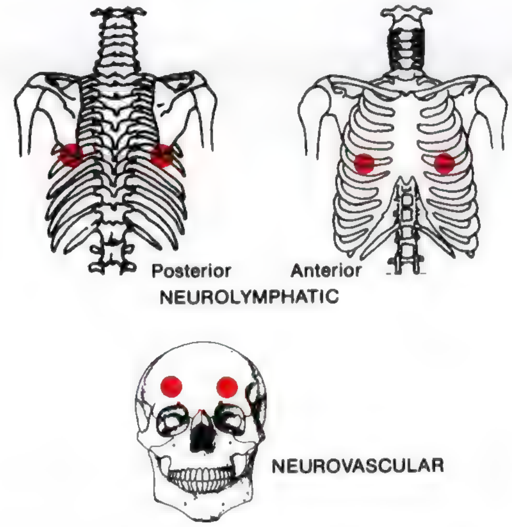
General Discussion: A comparative test between the flexor pollicis brevis and the adductor pollicis is important in cases where differential diagnosis of carpal tunnel syndrome and pisiform hamate syndrome is difficult (see Volume IV for details).

Flexor Pollicis Longus



19—31.

19—32.



Origin: Anterior surface of the radius from below the tuberosity. Adjacent interosseous membrane and a slip from the coronoid process of the ulna or the medial epicondyle of the humerus.

Insertion: Palmar surface of the base of the distal phalanx of the thumb.

Action: Flexes the interphalangeal joint of the thumb. Continued action, flexes the metacarpophalangeal and carpometacarpal articulations.

Testing Position: Patient seated with interphalangeal articulation held in flexion.

Stabilization: Examiner stabilizes 1st metacarpal and proximal phalanx.

Synergists: None

Test: Pressure directed against the tip of the distal phalanx on the palmar surface in the direction of extension.

Body Language of Weakness:

Testing position: Inability to flex interphalangeal articulation.

During test: There is no capability of synergistic action during this test.

Movement aberrations: Difficulty working the thumb with fingers for intricate activities.

Postural imbalance: Marked weakness or paralysis will cause hyperextension deformity.

Nerve Supply: Median, C6, 7, **8, T1**

Neurolymphatic:

Anterior: Behind areola on chest wall

Posterior: Immediately inferior to inferior angle of scapula.

Neurovascular: Bilateral frontal bone eminences

Meridian Association: Stomach

Organ Association: Stomach

General Discussion: Although the flexor pollicis longus has median nerve supply, the muscle is innervated prior to the carpal tunnel; consequently, in the presence of carpal tunnel syndrome, this muscle will be strong and must be correlated with the action of the flexor pollicis brevis, opponens pollicis, and adductor pollicis (see Volume IV).

Opponens Digiti Minimi

Origin: Hamulus of the hamate bone and flexor retinaculum.

Insertion: Shaft of the 5th metacarpal on the ulnar side.

Action: Flexes and slightly rotates the 5th metacarpal, brings the ulnar portion of the hand into position so that the little finger and thumb can approximate each other. Helps to cup the palm of the hand.

Testing Position: Patient brings the 5th metacarpal into a position of flexion and slight rotation. Palm up, a position of cupping the hand.

Stabilization: The thumb side of the hand is stabilized. If possible, care should be taken not to disturb possible subluxations in the wrist with the stabilization. This may give a negative test, when in reality there is a problem.

Test: Pressure is directed against the palmar surface of the 5th metacarpal head in a direction of extension in an effort to flatten the cupped hand.

Body Language of Weakness:

Testing position: Inability of the patient to bring the 5th metacarpal into flexion and rotation to cup the hand.

Movement aberrations: Difficulty in opposing the thumb and little finger.

Postural imbalances: Chronic involvement will cause atrophy of the muscle.

Nerve Supply: Ulnar, C7, **8, T1**

Neurolymphatic (provisional):

Anterior: inferior to the symphysis pubis at the height of the obturator (same as peroneus longus and brevis).

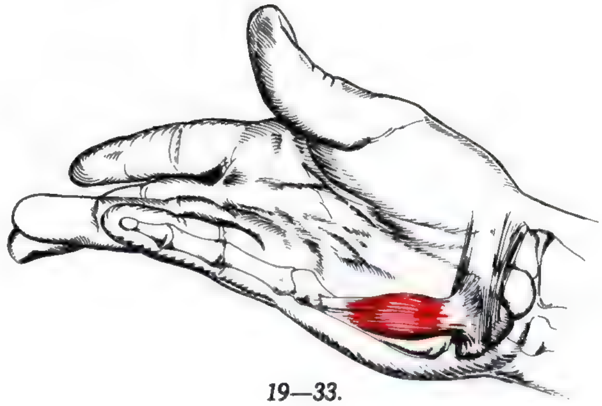
Posterior: between PSIS and L5 spinous.

Neurovascular (provisional): Bilateral frontal bone eminence.

Nutritional: When weakness is due to pisiform hamate syndrome, raw bone concentrate or nucleoprotein extract may be necessary for ligament involvement.

Meridian Association: Stomach

General Discussion: The opponens digiti minimi muscle is innervated by the ulnar nerve, which may be involved with a pisiform hamate syndrome, causing weakness of the muscle. Correlation of this muscle with muscles of median nerve involvement differentiates carpal tunnel syndrome and pisiform hamate syndrome (see Volume IV).



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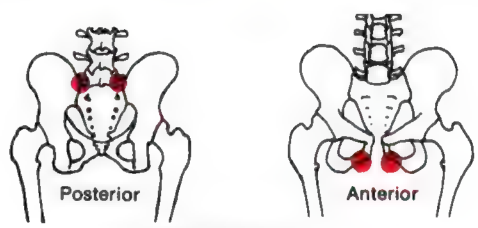
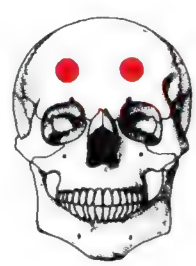


NEUROLYMPHATIC



NEUROVASCULAR

Flexor Digiti Minimi Brevis

Origin: Hook of the hamate bone and flexor retinaculum.

Insertion: Ulnar side of the base of the proximal phalanx of the 5th finger.

Action: Flexes the 5th digit at the metacarpophalangeal articulation.

Testing Position: 90° flexion of the metacarpophalangeal articulation with no flexion of the interphalangeal articulation.

Stabilization: The examiner stabilizes the dorsal surface of the hand.

Synergists: Flexor digitorum superficialis and flexor digitorum profundus.

Test: Pressure is directed to the palmar surface of the head of the proximal phalanx of the 5th finger in the direction of extension.

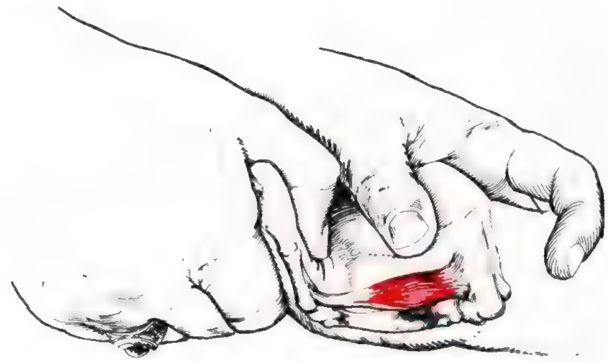
Body Language of Weakness:

Testing position: Inability to assume testing position without flexion of the interphalangeal articulation.

During test: Patient attempts to flex interphalangeal articulations to provide strength in test.

Nerve Supply: Ulnar, **C8, T1**

General Discussion: Helps differential diagnosis in pisiform hamate syndrome as opposed to carpal tunnel syndrome (see Volume IV).



19—35.

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Chapter 20

Trunk Muscles

Sternocleidomastoid

Origin:

Sternal head: anterior surface of the manubrium
Clavicular head: upper surface of the medial half of the clavicle

Insertion: Lateral surface of the mastoid process of the temporal bone and lateral half of the superior nuchal line of the occiput.

Action: Acting unilaterally, draws head toward the ipsilateral shoulder and rotates head to opposite side. Acting bilaterally, flexes head.

Testing Position: Patient lying supine, with the shoulders abducted and the elbows flexed so the hands are held over the head and not in contact with the table. Patient rotates head away from the muscle to be tested and lifts it from the table. The patient is placed in the testing position and the examiner lets go, observing the patient's ability to hold the position.

Patient Fixation Requirements: Adequate abdominal musculature is necessary to fix the thorax. Floyd and Silver[4] demonstrated almost simultaneous activity of the abdominal muscles with head-raising from the supine position. In fact, there was activity of the rectus abdominis when the sternocleidomastoids were contracted strongly enough only to stand out but not lift the head. They considered the rectus abdominis activity to be most significant; however, there was also oblique muscle participation. Their evaluation was of straight head-lifting from the supine position. It seems probable that the obliques would participate more in fixation of the thorax if the head-lifting were done from a turned position, giving unilateral activity of the neck flexors. Weakness of the abdominal muscles provides a poor base for sternocleidomastoid contraction.

Stabilization: In the supine position, the patient's body weight is adequate for stabilization. When the abdominal muscles are weak, the examiner or an assistant must stabilize the thorax. In children under five years of age, the abdominals are normally weak and the thorax should be stabilized.

Synergists: Scalene group

Test: Pressure is applied against the temporal area in a posterolateral direction. The examiner should observe for the patient's attempts to turn his head medially, recruiting more synergistic action of the scalene group and other neck flexors.

20—1.

20—2. Face must not be allowed to turn to midline to recruit medial neck flexors.

Body Language of Weakness:

Testing position: Patient cannot bring his head into the testing position, or hold it there if the examiner places the head and neck in the testing position and lets go.

During test: The patient's head will rotate medially, recruiting synergistic action. The shoulder on the tested side may be thrust back against the table to rotate the trunk, changing the test factors. The hands are held above the head and away from the table to avoid arm recruitment by pressure against the table.

Movement aberrations: Observing the patient arising from a supine position gives the examiner clues regarding sternocleidomastoid strength. With bilateral weakness, the patient will have difficulty arising from the table without head support. With unilateral weakness, the patient will turn his head toward the side of weakness to better use the strong muscle when arising.

Postural imbalance: Superior head tilt on side of weakness, with minimal shoulder drop in comparison to upper trapezius weakness. When the sternocleidomastoid causes head tilt, there is also head rotation to the side of weakness.

Alternate Testing Methods: Can be tested in a sitting or standing position. The examiner must adequately stabilize the trunk. The muscles can easily be tested in a standing position if the patient is leaning against an upright hi-lo adjusting table.

Nerve Supply: Anterior rami of C2, 3; spinal portion of the accessory nerve (cranial 11).

Sternocleidomastoid (continued)

20—3. *Starting position for test.*

20—4. *In the presence of weakness the patient tends to rotate the head to recruit synergistic medial neck flexors.*

20—5. *Illustration of continued rotation if examiner continues test.*

Neurolymphatic:

Anterior: 1st intercostal space, 3 1/2" from the sternum.

Posterior: lamina of C2.

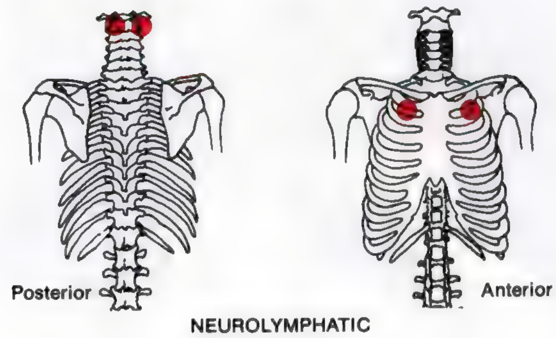
Neurovascular: Ramus of jaw below zygoma

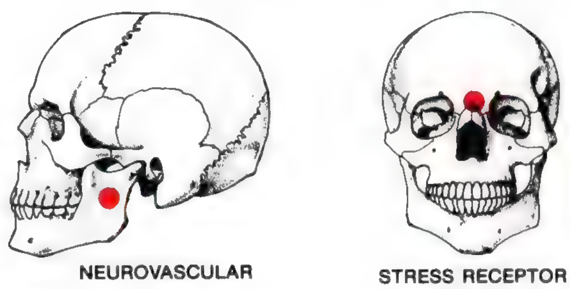
Reactive Muscle Correlation: Opposite psoas

Nutritional: Niacinamide or niacin and vitamin B_6. For sinusitis, organic iodine may be needed.

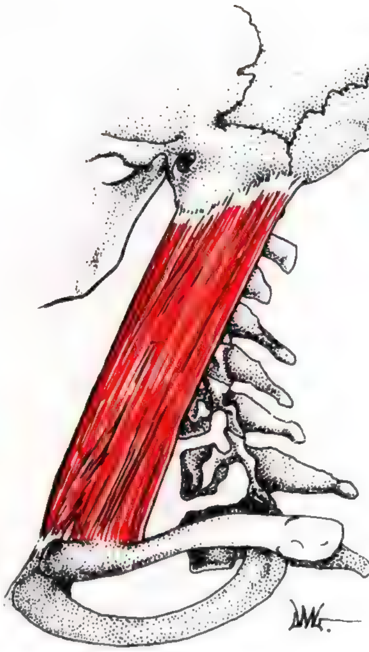
Meridian Association: Stomach

Organ Association: Sinuses

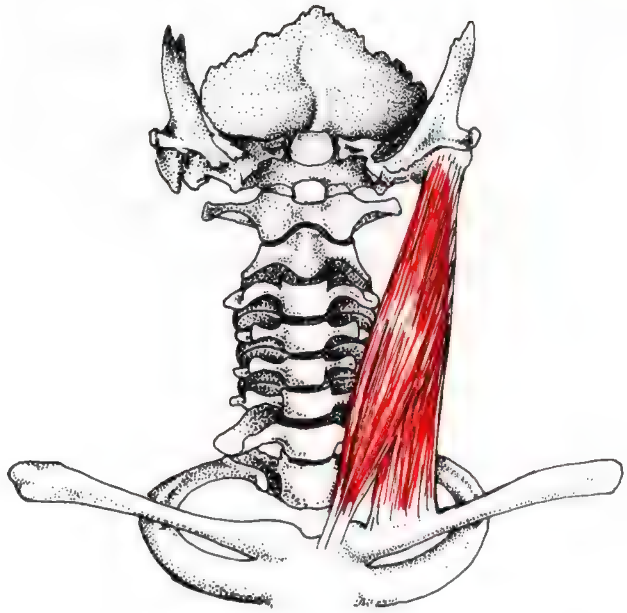




General Discussion: The nerve supply to the sternocleidomastoid is unusual; it receives both spinal and cranial innervation. This unusual innervation probably relates to the head-on-body balance mechanism in some manner. It is clinically observed in applied kinesiology that head-leveling corrections — such as occipital or vertebral adjustments and balancing of the head-leveling muscles — exert an influence on structural balance throughout the body. This is probably due to the influence on organization between the tonic neck, labyrinthine, and visual righting reflexes. Balancing of the muscles which have dual innervation (sternocleidomastoid and upper trapezius) often requires either vertebral manipulation or cranial fault correction. Other factors involved in applied kinesiology muscle balancing may also be required.



20—6. *Lateral view of sternocleidomastoid muscle.*



20—7. *Anterior view of sternocleidomastoid muscle.*

When the sternocleidomastoid muscle is weak as a result of cranial fault dysfunction, it is often due to an internal or external frontal bone rotation. Correction of the cranial fault will frequently make dramatic change in the strength of the muscle. It is often related to the hyperflexion/hyperextension cervical strain of the so-called "whiplash" injury. Other cranial faults and muscle disturbance associated with hyoid balance also relate with this type of injury (see Volume II).

Balanced function of the sternocleidomastoid muscles is very important in primary cranial respiratory function. The insertion of the muscle into the mastoid creates a lever force into cranial bone motion. Facilitation and inhibition of these muscles must be correct in the gait mechanism and in general body movements. Often there is a foot disturbance which adversely influences the muscles' actions. Sometimes balancing the adductor muscles strengthens the neck flexors.

The fact that the sternocleidomastoid inserts along the lateral half of the superior nuchal line of the occiput is often overlooked. This is important when evaluating the muscle for the need of origin/insertion technique, proprioceptive activity, or the treatment of these factors.

In applied kinesiology, the sternocleidomastoid is associated with the sinuses. When there is sinus involvement, there is usually an active neurolymphatic reflex. Its activation is often clinically productive in influencing sinus drainage. If the basic underlying cause of the sinus involvement — which may be an allergy, nutritional deficiency, etc. — is not corrected, the neurolymphatic reflex correction will not hold. A persistent, active reflex to the sinuses indicates that further evaluation should be done to find the cause.

Improved drainage in sinus conditions can be accomplished by placing the patient in a retrograde position while activating the neurolymphatic reflex. The reflex may require prolonged stimulation, sometimes up to three to five minutes. Adequate reflex stimulation is indicated by the elimination of positive therapy localization.

The sternocleidomastoid muscles are sometimes considered accessory respiration muscles. In electromyographic studies, the scalene group is active in respiration, but the sternocleidomastoids have limited — if any — activity.[3, 5]

Medial Neck Flexors

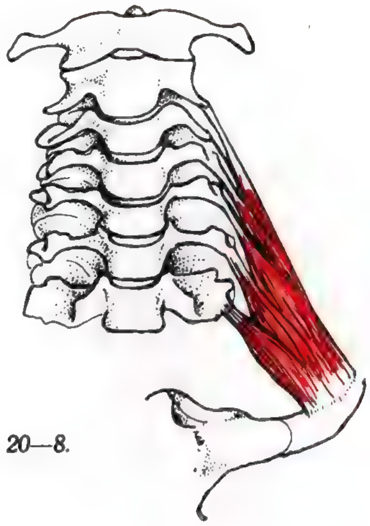
SCALENUS ANTICUS

Origin: Anterior tubercles of the transverse processes of the 2nd-6th cervical vertebrae.

Insertion: Scalene tubercle on upper surface of the 1st rib.

Action: Flexes and rotates cervicals; raises 1st rib.

Nerve Supply: Anterior branches, C5, 6, 7, 8



20—8.

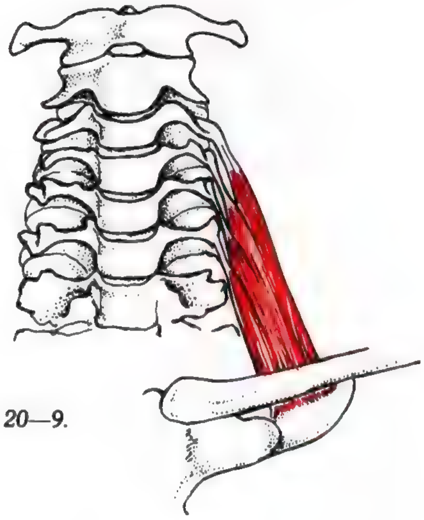
SCALENUS MEDIUS

Origin: Posterior tubercles of the transverse processes of 2nd-7th cervical vertebrae.

Insertion: Upper surface of the 1st rib behind subclavian groove.

Action: Flexes and rotates cervical vertebrae; raises 1st rib.

Nerve Supply: Posterior branches of anterior primary rami of C3, 4. Lateral muscular branches C3, 4.



20—9.

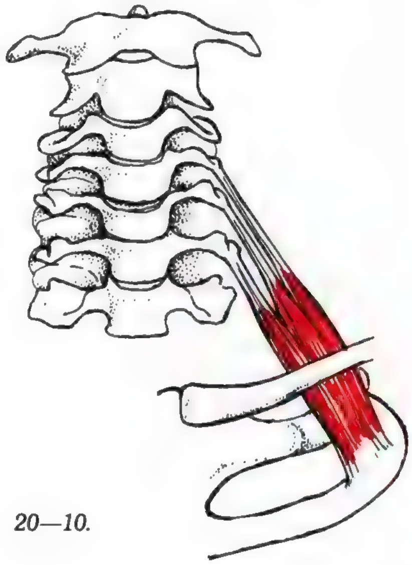
SCALENUS POSTICUS

Origin: Posterior tubercles of transverse processes of 4th, 5th, and 6th cervicals.

Insertion: Outer surface of 2nd rib behind attachment of serratus anticus.

Action: Flexes and rotates cervical vertebrae; raises 2nd rib. **Note:** All scalenes, when acting bilaterally, flex the neck.

Nerve Supply: Posterior branches of C5-8. Lateral muscular branch of C3, 4.



20—10.

LONGUS CAPITIS

Origin: Anterior tubercles of transverse processes of the 3rd-6th cervical vertebrae.

Insertion: Inferior surface of the basilar portion of the occiput.

Action: Flexes cervical vertebrae and head; unilaterally rotates and flexes cervical vertebrae and head.

Nerve Supply: Muscular branches of C1-4.

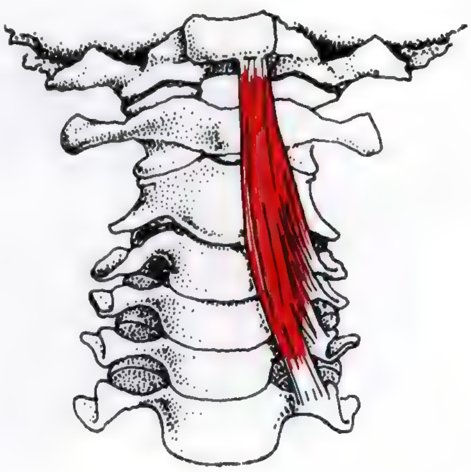
LONGUS COLLI

Origin: From bodies of the first 3 thoracic and last 3 cervical vertebrae, with slips from other areas.

Insertion: Bodies of 2nd, 3rd, and 4th cervicals with slips to other areas.

Action: Flexes cervical vertebrae unilaterally; assists in rotation and lateral flexion.

Nerve Supply: Anterior primary rami of C2-8.



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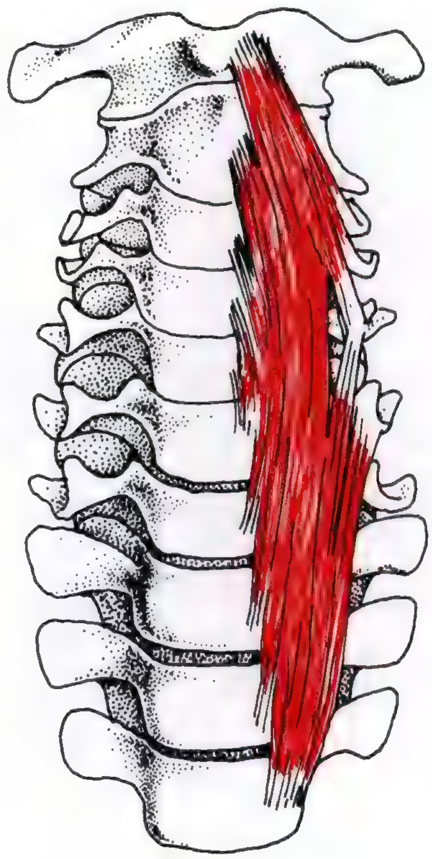


20—12.

Medial Neck Flexors (continued)

Testing Position: Patient supine, arms abducted and elbows flexed so hands are held off table. Patient turns head to 10° away from the side being tested and flexes head and neck on trunk. The head should be maintained in the midline with no lateral tilt.

Patient Fixation Requirements: Normally functioning abdominal muscles are necessary for fixing the thorax so that there is a stable base for scalene muscles to function. This fixation is not as important as it is in the sternocleidomastoid test.

Stabilization: Patient's body weight is adequate for stabilization.

Synergists: Sternocleidomastoid, suprahyoid and infrahyoid muscles, and the platysma.

Test: The examiner uses the ulnar edge of the hand, pressing against the forehead in the direction of neck extension directly toward the table and not in alignment with the 10° rotation of the patient's head. The edge of the hand gives better directional force; it reduces the patient's ability to work rotational factors into the test against the examiner's flat hand. Observation should be made for the patient's attempt to rotate his head, recruiting more activity from the synergists. The patient should also be prevented from laterally tilting his head.

Body Language of Weakness:

Testing position: Patient has difficulty bringing head and neck into the testing position or in holding it if the examiner places the head and neck in the testing position.

20—13. Head turned approximately 10° away from side tested. Do not allow the patient to turn the head during the test.

During test: Patient must be capable of accomplishing the test with the 10° head rotation. The individual with weak scalene muscles will turn the head slightly medial to obtain better bilateral function and action of the synergistic muscles. There may also be an effort to turn the head more lateral to recruit more unilateral sternocleidomastoid function.

Movement aberrations: Difficulty in arising from a supine position without head and neck support.

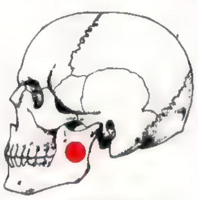
Postural imbalances: Loss of normal lordosis of cervical spine as observed on x-ray, especially from weakness of the scalene group. This is frequently present after an injury from whiplash dynamics. Fountain et al.,[6] in a study of one individual using needle electrodes in the longus colli, concluded that muscle spasm is responsible for straightening the cervical lordotic curve after injury to the neck. This does not concur with clinical findings in applied kinesiology, as there is typically apparent weakness of the medial neck flexors when there is a straightening of the lordotic curve as observed on x-ray. Of course, it is difficult to differentiate between the neck flexor muscles in manual muscle testing. Lateral neck tilt is present from unilateral weakness of the scalene group.

Alternate Testing Methods: These muscles may be tested in a seated or standing position. The examiner must stabilize the trunk. The easiest weight-bearing test is obtained by leaning the patient against an upright hi-lo table.

Neurolymphatic:

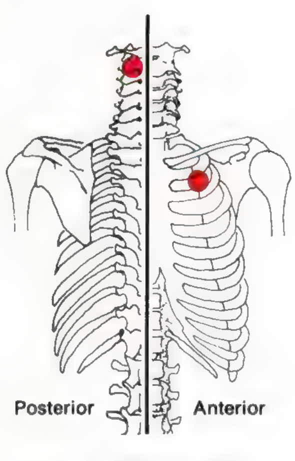
Anterior: 1st intercostal space 3 1/2" from sternum

Posterior: lamina C2



NEUROVASCULAR

STRESS RECEPTOR



NEUROLYMPHATIC
BILATERAL

Neurovascular: Ramus of jaw below zygoma.

Reactive Muscle Correlation: Opposite psoas.

Nutritional: Vitamin B_6, niacinamide or niacin.

Meridian Association: Stomach

Organ Association: Sinuses

General Discussion: When sinuses are involved, the muscular weakness is often due to lymphatic involvement. Improved sinus drainage can be obtained if the patient is placed in the retrograde — head low — position. The neurolymphatic reflex may require considerable manipulation to clear the involvement.

The scalene muscles are accessory muscles of respiration.[3, 9] They are active during quiet respiration, and highly active during forced inspiration. It is generally considered that the scalenes anchor the 1st rib during quiet breathing, while the external intercostals elevate the remaining ribs toward the 1st.[1]

The scalene muscles have been associated with a neurovascular compression syndrome usually known as the scalenus anticus syndrome. Surgery has had a high failure rate.[8] In some quarters, neurological compression from abnormal scalene pressure has been virtually denied as a cause of upper extremity pain.[7] When there is an apparent scalenus anticus syndrome of an acquired nature and without a space-occupying lesion, there are good results from the clinical applied kinesiology approach. Occasionally the muscles of the cervical region, including the scalene group, are primarily involved. Usually the local area causing compression is secondary to some other involvement, such as a category I pelvic fault, foot problem, etc. (see Volume IV).

The longus colli and longus capitis are probably involved in the rocker motion of the cervical spine with the occiput, as described on page 81. The longus colli is the only muscle which attaches to the anterior of the spine and is completely confined to the vertebrae. These muscles are inaccessible for direct treatment by applied kinesiology techniques, with the exception of stretching or contraction such as is used in the rocker motion technique.

Vitty et al.,[10] using bipolar fine-wire electrodes, studied the longus colli and its action compared to the ipsilateral sternocleidomastoid muscle. The two muscles act synchronously in flexion and extension movements, and act together ipsilaterally in lateral flexion. During free rotation to the right, the right longus colli is active with the left sternocleidomastoid.

Neck Extensors (Deep)

SPLENIUS CAPITIS

Origin: Spinous processes of C7-T3, lower half of ligamentum nuchae.

Insertion: Mastoid process and lateral portion of superior nuchal line.

Action: Extend, laterally flex, and rotate head and neck.

Nerve Supply: Middle cervical spinal nerves.

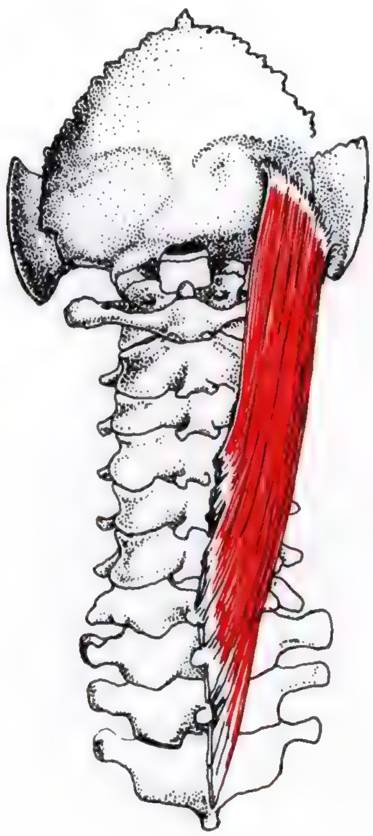
SPLENIUS CERVICIS

Origin: Spinous processes of 3rd-6th thoracic vertebrae.

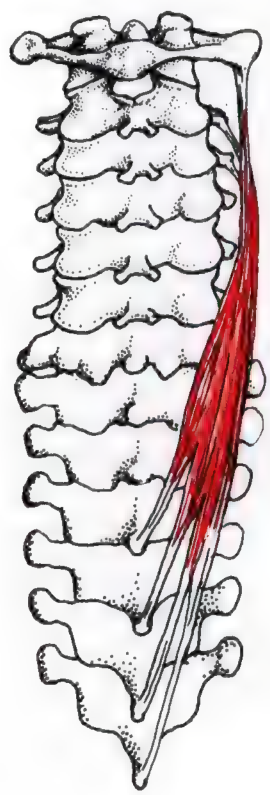
Insertion: Upper 3 or 4 cervical vertebrae transverse processes on the posterior aspect.

Action: Extend, laterally flex, and rotate neck.

Nerve Supply: Lower cervical spinal nerves.



20—14.



20—15.

SEMISPINALIS CAPITIS

Origin: 7th cervical and 1st-6th thoracic transverse processes and articular processes of 4th, 5th, and 6th cervical vertebrae.

Insertion: Between superior and inferior nuchal lines of the occiput.

Action: Extension and lateral flexion of the neck and head.

Nerve Supply: Spinal nerves C1, 2, 3, 4, 5, 6

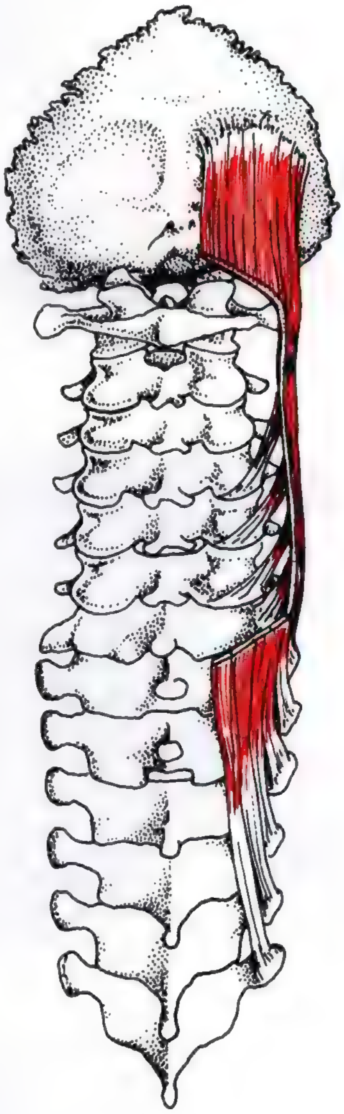
SEMISPINALIS CERVICIS

Origin: Transverse processes of upper 6 thoracic, articular processes of lower 4 cervical vertebrae.

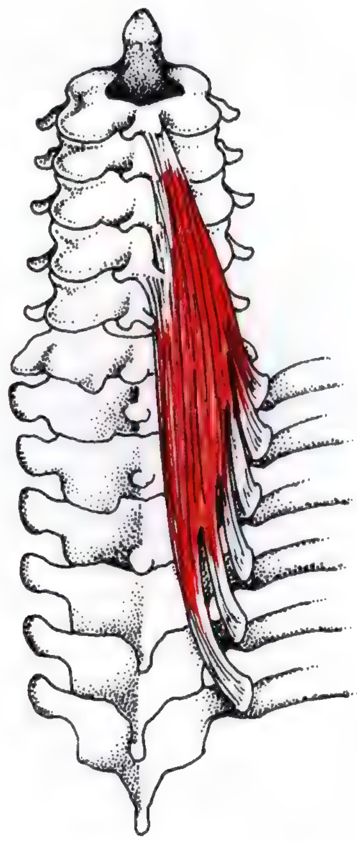
Insertion: Spinous processes of 2nd-5th cervical vertebrae.

Action: Extension and lateral flexion of neck and head.

Nerve Supply: Spinal nerve C6, 7, 8



20—16.

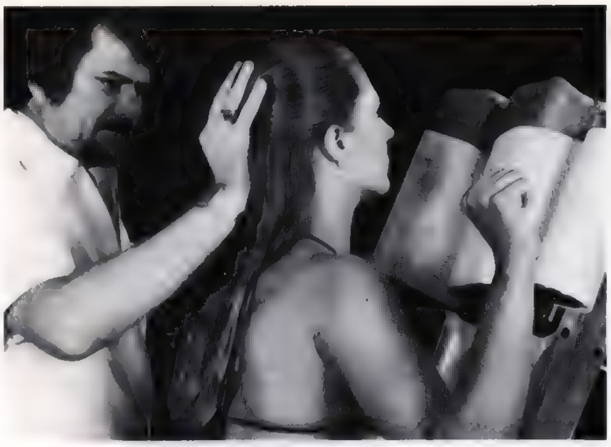


20—17.

Neck Extensors (Deep) continued

20—18. *Neck extensors tested bilaterally. Subject's hands are not in contact with the table.*

20—19. *Neck extensors tested unilaterally.*



20—20. Weight-bearing bilateral neck extensor test. Important in evaluating for lumbar fixations.

20—21. Weight-bearing unilateral neck extensor test. Important in evaluating for weight-bearing sacral or sacroiliac fixations.

Testing Position: Patient prone with shoulders and elbows flexed to approximately 90° so the hands are held above the head and off the table, face turned toward side being tested.

Stabilization: The patient's body weight is adequate stabilization.

Synergist: The upper trapezius is generally considered as synergistic in neck extension. Yamshon and Bierman[11] observed by electromyography only occasional activity of the upper trapezius in neck extension of the prone individual. When the activity was against resistance, there was more involvement of the muscle. It seems from these studies that the upper trapezius is not a strong participant in neck extension unless there is also considerable lateral flexion.

Test: Pressure directed against posterolateral aspect of head in a direction toward the table.

Body Language of Weakness:

- **Testing position:** Difficulty in positioning the neck and head for the test, or in maintaining the testing position if the examiner places the patient in the testing position. Patient attempts to take neck and head out of rotation to recruit the opposite side, or laterally flexes head to recruit more upper trapezius activity.
- **Movement aberrations:** When arising from a prone position, the patient will rotate the head toward the side of strength.
- **Postural imbalances:** Lateral flexion of neck and head.

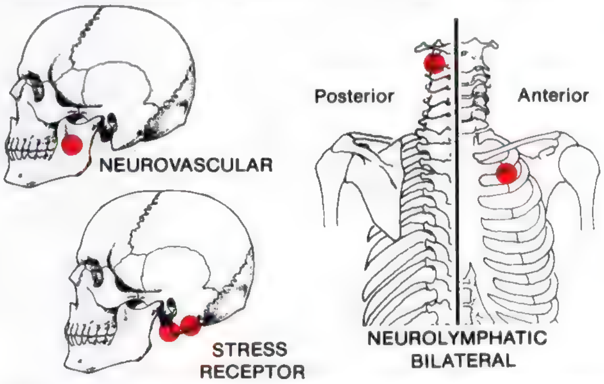
Alternate Testing Methods: Can be tested in standing position if weight-bearing test is needed. It is best to lean the patient against an upright hi-lo table. The muscles may also be tested in the seated position.

The bilateral neck extensors are frequently tested as indications for functional fixation of the lumbar spine.

Neurolymphatic:

- **Anterior:** 1st intercostal space 3 1/2" from sternum.
- **Posterior:** C2 lamina.

Neurovascular: Ramus of jaw below zygoma.



Reactive Muscle Correlation: Opposite piriformis. Primarily associated with splenius capitis.

Nutritional: Vitamin B_6, niacinamide, organic iodine

Meridian Association: Stomach

Organ Association: Sinuses

General Discussion: Unilateral weakness of the neck extensors when there is no other apparent reason clinically indicates a functional fixation of the sacroiliac articulation. When the neck extensors are weak on both the right and left sides when each side is tested individually, there is indication of a bilateral sacral fixation. When the neck extensors are strong bilaterally when each group is tested individually but weak when tested together, a lumbar fixation is indicated.

Sacrospinalis (As A Group)

Origin: Separate slips of muscle arising from the sacrum, crest of the ilium, spinous processes, transverse processes, and ribs.

Insertion: Into the ribs, transverse processes, spinous processes, and occiput.

Action: Extension, lateral flexion, and rotation of vertebral column; lateral movement of pelvis.

Testing the Sacrospinalis: Specific sections of the sacrospinalis can be tested directly with manual muscle testing. In all cases, there is considerable synergism and overlap of muscle function. A general test is for the patient to laterally flex the spinal column while the examiner observes for range of motion bilaterally. Observation of the patient in Adam's position and while sitting, standing, or in the prone position, gives the examiner some indication of the muscles by making a bilateral comparison of apparent tone or flaccidity. Following this general discussion of the sacrospinalis is a breakdown of the group into individual divisions. Beardall[2] has developed additional tests for some of the sections of the sacrospinalis; they are presented in his text.

Testing Position (general): Patient in standing position, with feet spread apart to give a stable base and help prevent lateral pelvic shift.

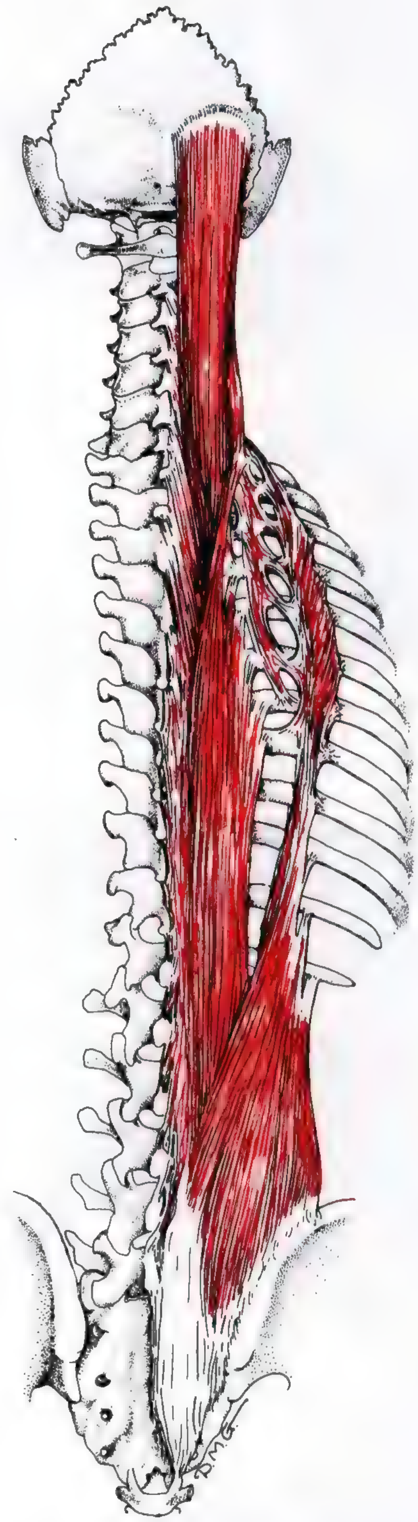
Patient Fixation Requirements: As the patient progresses through the test, there should be no pelvic or trunk twist. The pelvis should also be maintained in the starting position, with no lateral shift.

Stabilization: The examiner may need to stabilize the pelvis to avoid twisting or lateral shifting.

Test: The patient laterally flexes the trunk, reaching down the leg as far as possible to indicate lateral flexion ability. The examiner observes how far the hand will travel down the leg, and repeats the test on the opposite side for comparison. The patient will be able to flex laterally further on the side opposite general sacrospinalis weakness. Care must be taken to evaluate other muscles that restrict lateral flexion capability, such as the quadratus lumborum, psoas, abdominals, and latissimus dorsi. Also, spinal curvatures which may influence lateral flexion should be considered.

Body Language of Weakness:

Testing position: The examiner checks for an imbalance between the right and left sacrospinalis. The weak sacrospinalis will be flat and atonic, whereas the hypertonic or tight sacrospinalis will stand up in a "ropy" manner. This is



20—22. Portions of the sacrospinalis are hidden by overlying muscles. See pages 448-455 for individual divisions.

20—23. The patient will laterally flex further toward the side opposite general sacrospinalis weakness. A similar test can be done in the seated position.

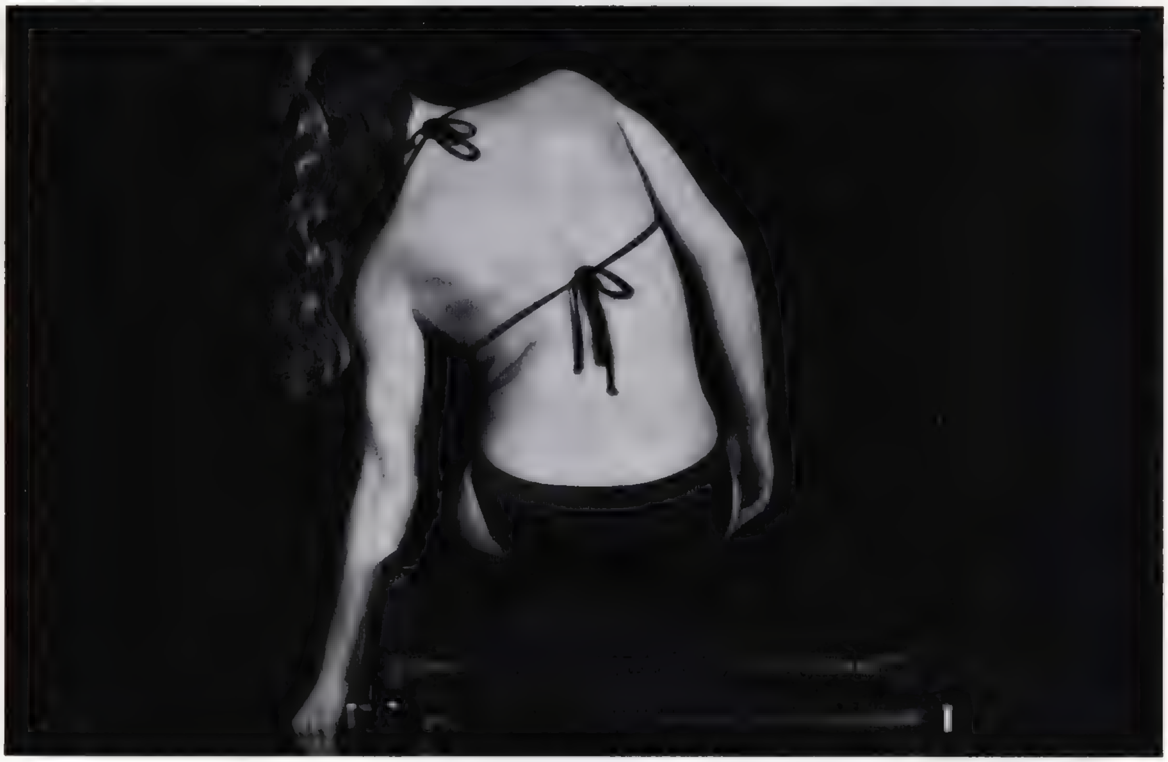
best observed when the patient is prone.

During test: In the lateral flexion test, the patient will tend to twist the pelvis and trunk more when laterally flexing toward the weak side. This is because the hypertonic or stronger side limits lateral flexion.

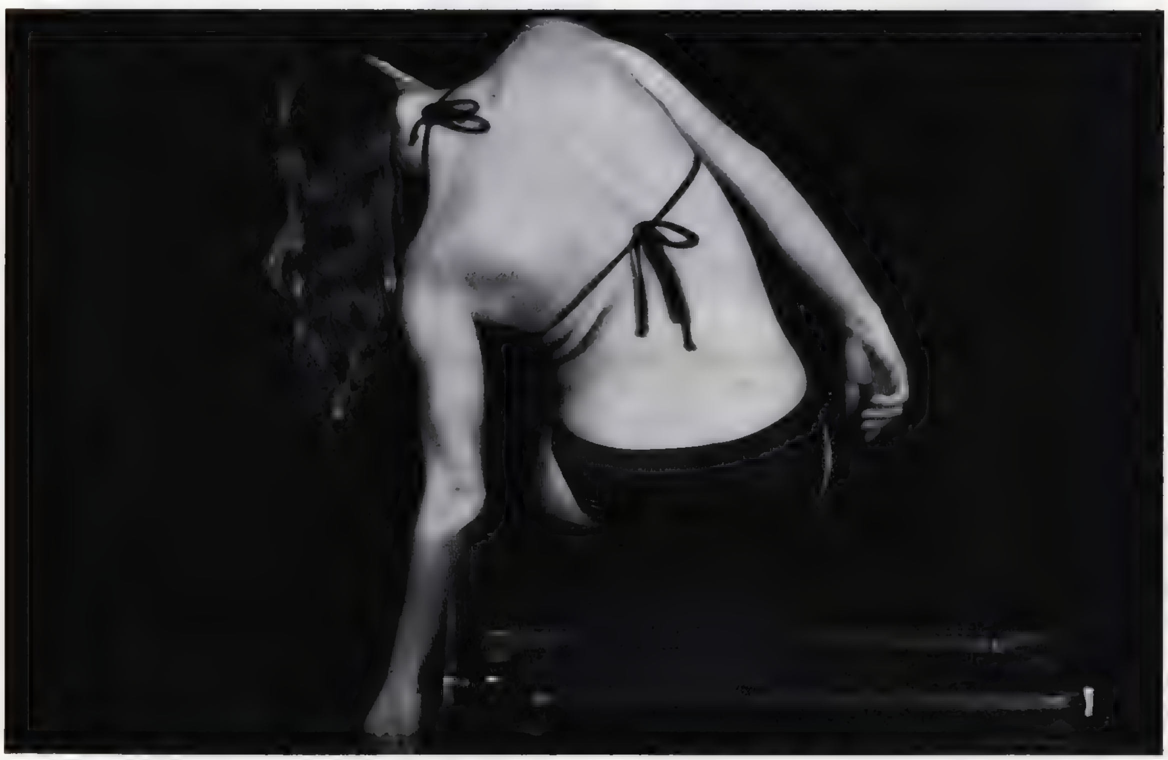
Postural imbalances: When there is general weakness on one side of the sacrospinalis, there will be a C-type spinal curvature with the convexity on the side of weakness. There will be a low ilium, high shoulder and head on side of weakness. Generally there will not be weakness throughout the sacrospinalis on one side. The usual picture is for the sacrospinalis to be hypertonic and weak in different sections on the same side (see Volume IV under "Idiopathic Scoliosis").

Alternate Testing Methods: The prone patient hyperextends and rotates the spine without the aid of the arms. The examiner, stabilizing the thighs against the table, directs pressure against the thorax on the side of rotation toward flexing the spine. The patient must be capable of adequately fixing the pelvis to the legs. This is a general test for the sacrospinalis, and synergistic muscles must be taken into consideration.

Sacrospinalis (As A Group) continued

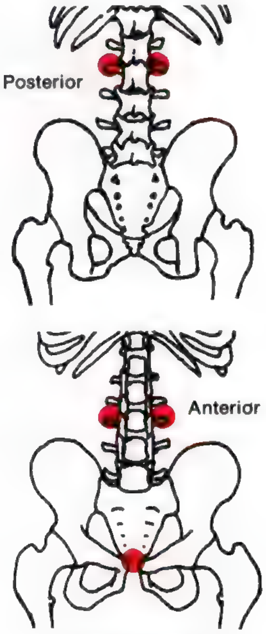


20—24. Seated test does not give effective pelvic stabilization.



20—25. Examiner must observe carefully not to allow lateral pelvic tilt, as present in this test.

20—26. Prone sacrospinalis general test.



Neurolymphatic:
Anterior: Over the symphysis pubis and lateral to the umbilicus.
Posterior: L2, transverse process

Neurovascular: Bilateral frontal bone eminences.

Reactive Muscle Correlation: Transverse abdominis, gluteus maximus, hamstrings.

Nutritional: Vitamins A, C, P, E, and calcium

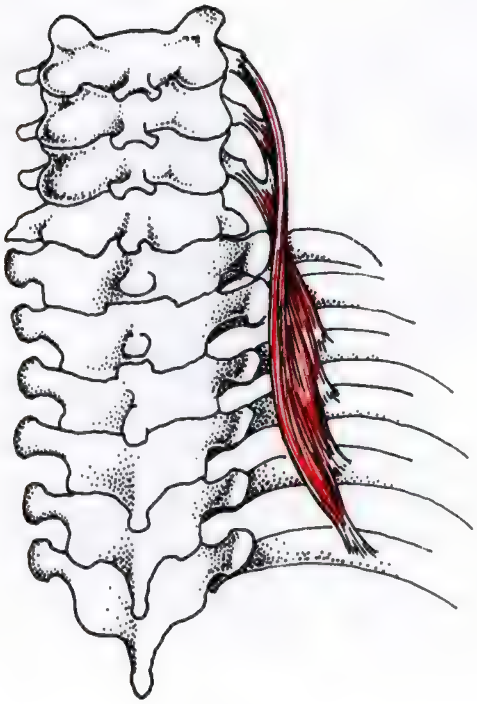
Meridian Association: Bladder

Organ Association: Urinary bladder

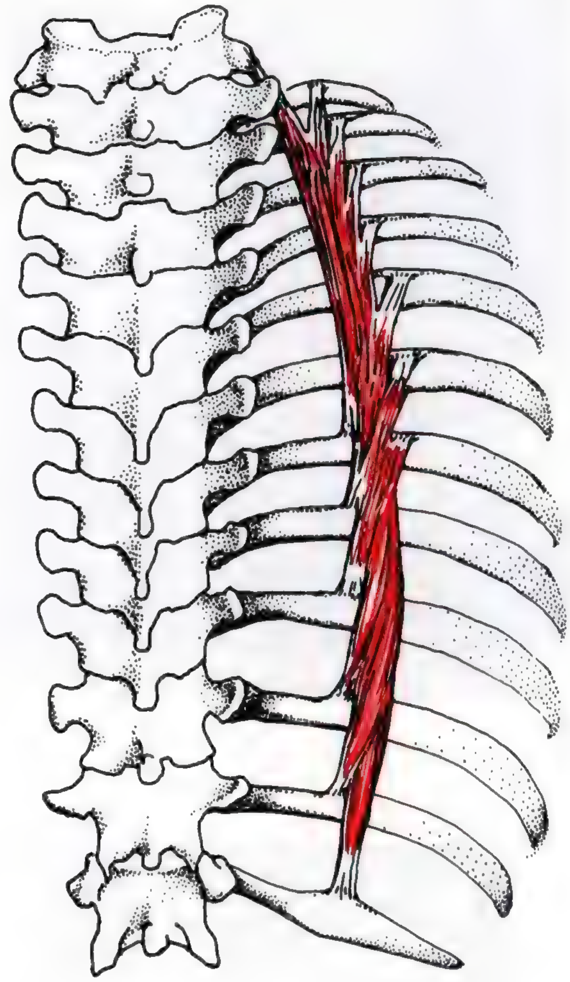
General Discussion: There has been considerable morphologic and electromyographic study of the sacrospinalis relating to idiopathic scoliosis. Applied kinesiology has treated the sacrospinalis primarily by morphologic study related to the patient's x-rays and palpation. Clinical attempts have been made to influence divisions of the sacrospinalis by AK techniques for treatment of idiopathic scoliosis. This has been somewhat productive clinically, but it certainly has not provided a complete understanding of the condition.

A consistent finding in idiopathic scoliosis is neurologic disorganization known in AK as "switching." In recent years, additional AK approaches to switching have been developed which have been productive in organizing the sections of the sacrospinalis. These appear to be more efficient approaches to idiopathic scoliosis than have yet been developed in any other of the healing arts' fields. The subject is discussed more thoroughly in Volume IV.

Iliocostalis Group



20—27.



20—28.

ILIOCOSTALIS CERVICIS

Origin: From the angles of the 3rd-6th ribs.

Insertion: Into posterior tubercles of the transverse processes of the 4th, 5th, and 6th cervical vertebrae.

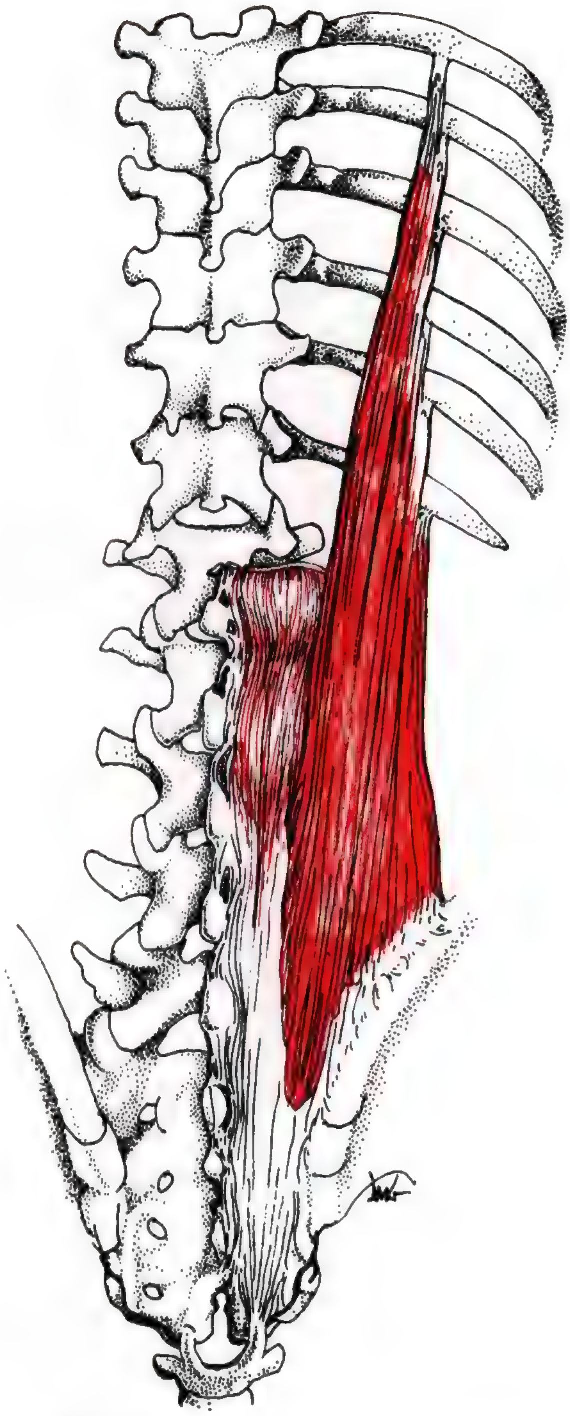
Action: Extends the vertebral column and laterally flexes it.

ILIOCOSTALIS THORACIS

Origin: From upper borders of the lower 6 ribs medial to the tendons of insertion of the iliocostalis lumborum.

Insertion: Into the angles of the upper 6 or 7 ribs and into the transverse process of the 7th cervical vertebra.

Action: Extends the spine and laterally flexes it; draws the ribs caudalward.



20—29. *Iliocostalis lumborum with longissimus thoracis severed.*

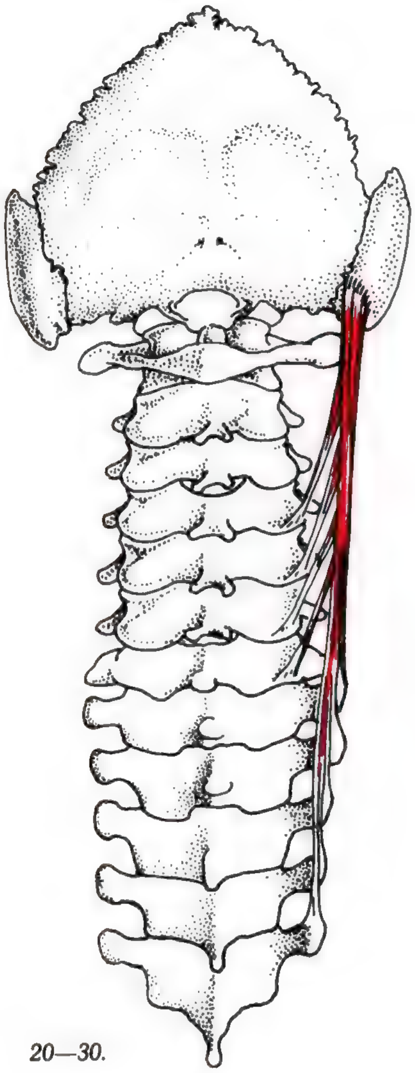
ILIOCOSTALIS LUMBORUM

Origin: From anterior surface of a broad and thick tendon which is attached to the sacrum, spinouses of the lumbar vertebrae, and from the inner lip of the iliac crest.

Insertion: Into the inferior borders of the lower 6 or 7 ribs at the angle.

Action: Extends the spine and laterally flexes it; draws the ribs caudalward.

Longissimus Group



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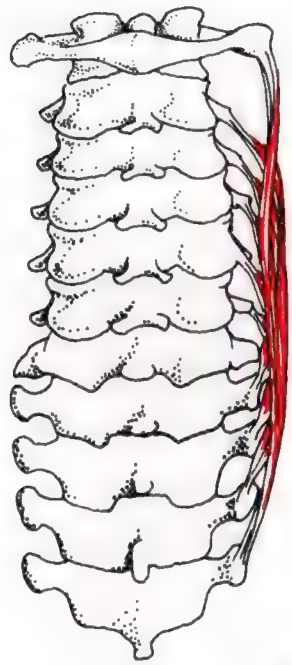


20—31.

LONGISSIMUS CAPITIS

Origin: Transverse processes of the upper 4 or 5 thoracic vertebrae, and the articular processes of the last 3 or 4 cervical vertebrae.

Insertion: Into the posterior margin of the mastoid process.

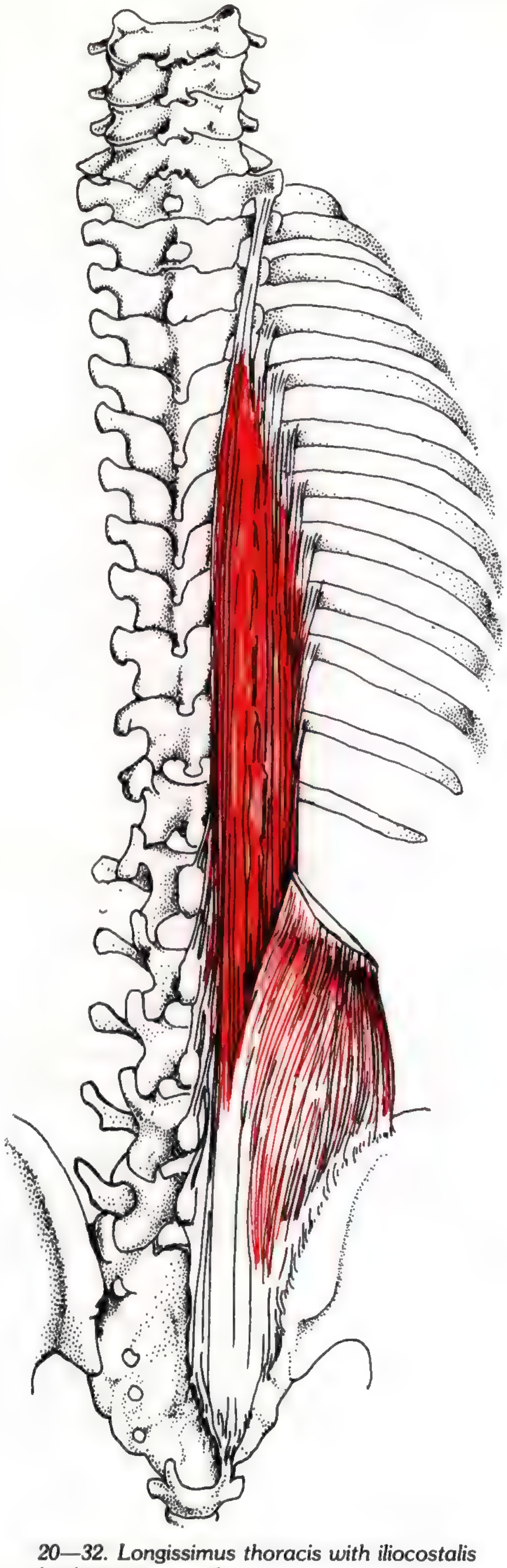
Action: Extends the head; acting unilaterally, bends and rotates the head to the same side.

LONGISSIMUS CERVICIS

Origin: From the transverse processes of the upper 4 or 5 thoracic vertebrae.

Insertion: Into the posterior tubercles of the transverse processes of the 2nd-6th cervical vertebrae, and sometimes to the atlas transverse process.

Action: Extends the spine and laterally flexes it.



20—32. *Longissimus thoracis with iliocostalis lumborum severed.*

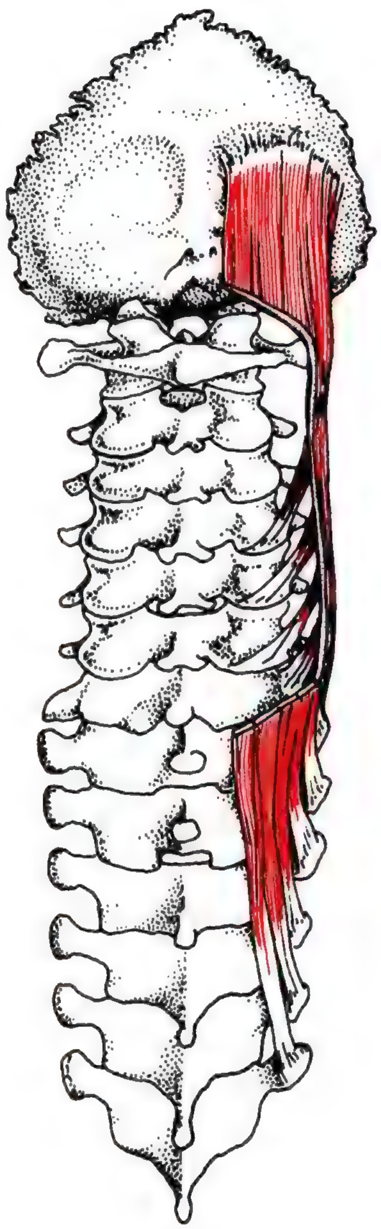
LONGISSIMUS THORACIS

Origin: From common broad thick tendon with the iliocostalis lumborum; fibers from transverse and mammillary processes of the lumbar vertebrae and lumbocostal aponeurosis.

Insertion: Into the tips of the transverse processes of all thoracic vertebrae, and into the lower 9 or 10 ribs between the tubercles and angles.

Action: Extends the spine and laterally flexes it; draws ribs caudalward.

Semispinalis Group



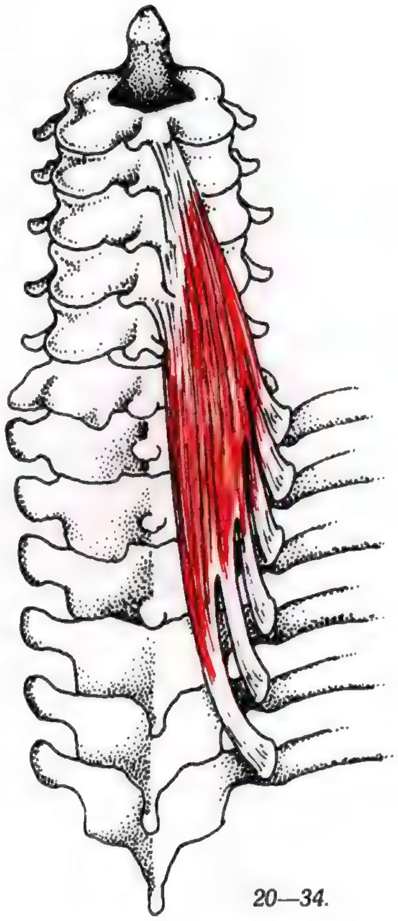
20—33.

SEMISPINALIS CAPITIS

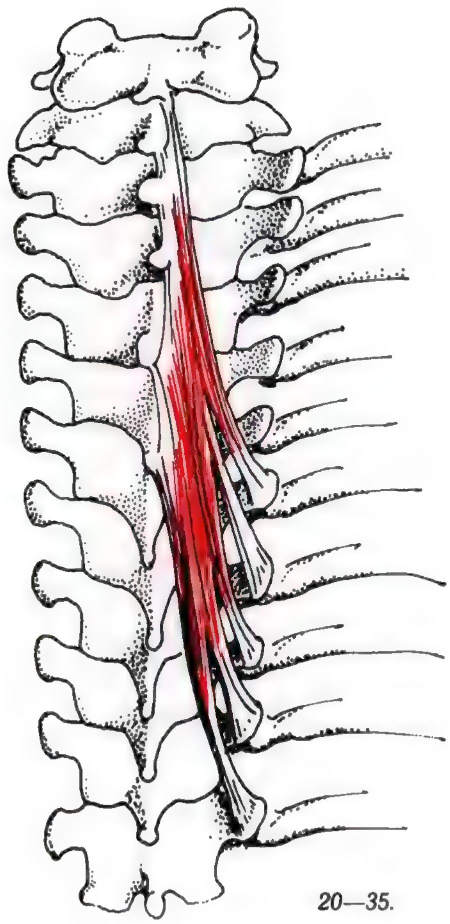
Origin: 7th cervical and 1st-6th thoracic transverse processes, and the articular processes of the 4th-6th cervical vertebrae.

Insertion: Between superior and inferior nuchal line of the occiput.

Action: Extension and lateral flexion of the spine and head.



20—34.



20—35.

SEMISPINALIS CERVICIS

Origin: Transverse processes of the upper 6 thoracic vertebrae and articular processes of the lower 4 cervical vertebrae.

Insertion: Into spinous processes of the 2nd-5th cervical vertebrae.

Action: Extension and lateral flexion of the spine and head; rotates head to opposite side.

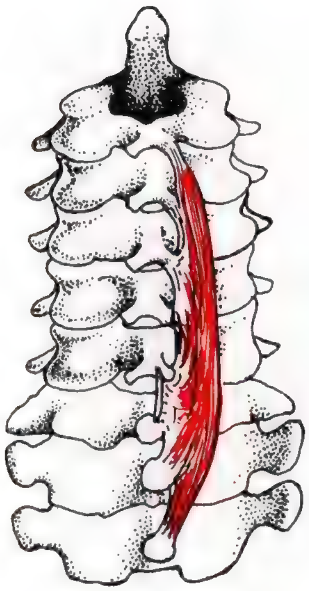
SEMISPINALIS THORACIS

Origin: From transverse processes of the 6th-10th thoracic vertebrae.

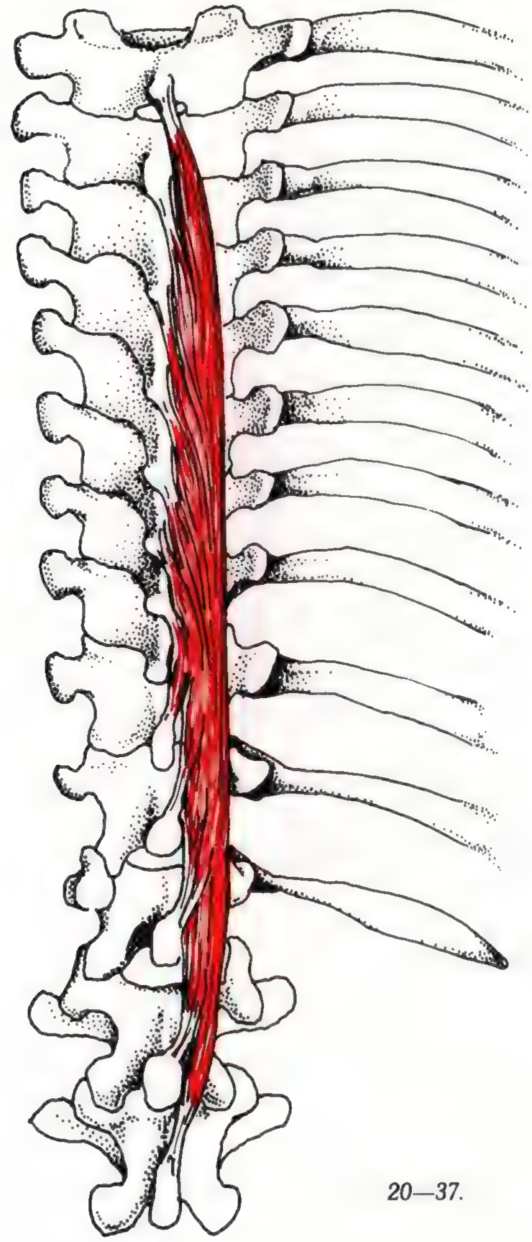
Insertion: Into the spinous processes of the first 4 thoracic and last 2 cervical vertebrae.

Action: Extends the spine and rotates it toward the other side.

Spinalis Group



20—36.



20—37.

SPINALIS CERVICIS

Origin: From the lower portion of the ligamentum nuchae, spinous processes of the 7th cervical, and maybe 1st and 2nd thoracic vertebrae.

Insertion: Into the spinous process of axis, and maybe 3rd and 4th cervical spinous processes.

Action: Extends the spine.

SPINALIS CAPITIS

Usually inseparably connected with the semispinalis capitis.

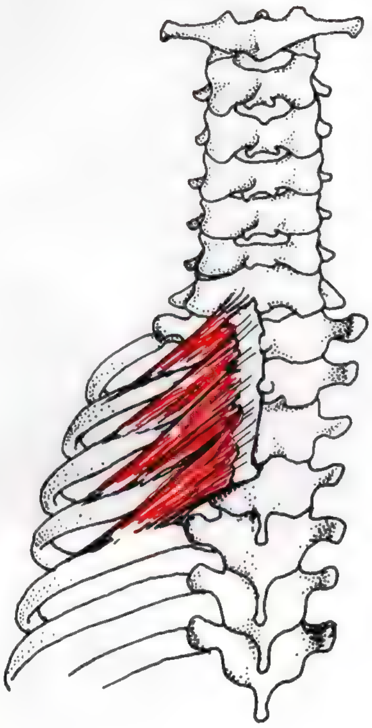
SPINALIS THORACIS

Origin: From spinous processes of the upper 2 lumbar and lower 3 thoracic vertebrae.

Insertion: Into the spinous processes of the upper thoracic vertebrae with the number varying from 4-8.

Action: Extends the spine.

Serratus Posterior Superior



20—38.

Origin: Lower portion of ligamentum nuchae and spinous processes of the 7th cervical and upper 3 or 4 thoracic vertebrae.

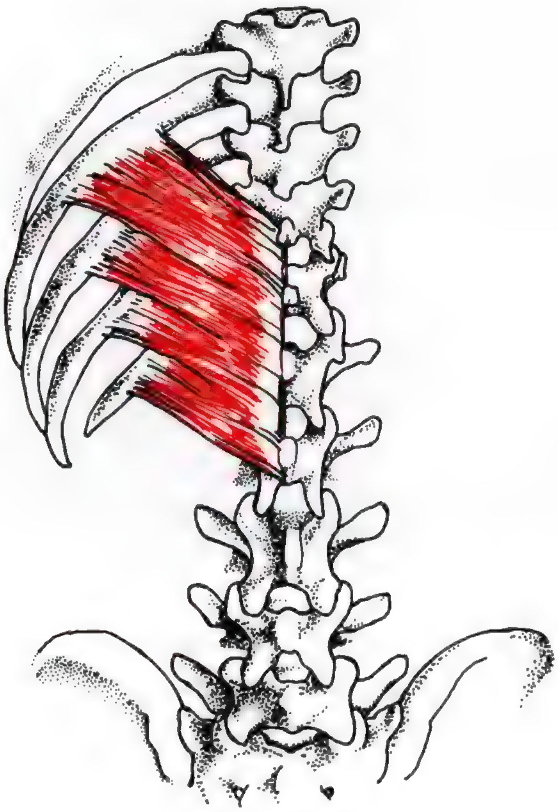
Insertion: Upper border of 2nd-5th ribs distal to the angles.

Action: Elevates the ribs and is a muscle of inspiration.

Nerve Supply: Anterior primary rami of T1-4.

Comment: There has been no test developed for the serratus posterior superior. Its evaluation is by therapy localization and sometimes challenge. It is important to consider this muscle in rib fixations, subluxations, and when using retrograde lymphatic and PRY techniques.

Serratus Posterior Inferior



20—39.

Origin: Spinous processes of T11-12 and L1-2, and the lumbar fascia

Insertion: Inferior border of lower 4 ribs just beyond their angles.

Action: Counteracts the pull of the diaphragm by drawing the ribs posterior and inferior.

Nerve Supply: Anterior primary rami of T9-12.

Comment: No specific test has been developed for the serratus posterior inferior. In applied kinesiology it is tested with therapy localization and sometimes challenge. It is evaluated when there are rib subluxations or fixations, respiratory disturbance, or when PRY and retrograde lymphatic techniques are used.

Quadratus Lumborum

Origin: Iliolumbar ligament, posterior part of the iliac crest.

Insertion: Inferior border of the last rib and transverse processes of the upper 4 lumbar vertebrae.

Action: Lateral flexion of lumbar vertebral column; depresses last rib; helps action of the diaphragm in inspiration.

Reversed Origin-Insertion and Change of Action: When the thoracic cage and lumbar spine are fixed, the quadratus lumborum elevates the pelvis.

Testing Position: The quadratus lumborum can be tested as a general muscle or divided into the costal or lumbar division.[2]

The patient is supine, with the pelvis laterally flexed in relation to the trunk. This approximates the crest of the ilium and the lateral aspect of the thoracic cage on the side of test. The legs are not abducted or adducted relative to the pelvis. For the general muscle test, the pelvis will be laterally flexed to have the legs 10° from the center line of the table. For the lumbar division, the legs will be 15° from the center line of the table; for the costal division, they will be 5° from the center line of the table.

Patient Fixation Requirements: Since the legs are being used as levers to impart motion to the pelvis, the gluteus medius and minimus on the side of the quadratus lumborum test and the adductors on the ipsilateral side of the test must be adequate to fix the legs to the pelvis.

Stabilization: The doctor must stabilize the pelvis on the contralateral hip. The patient's body weight provides a portion of the stabilization. If the patient is light-weight or the table surface is slippery, the patient should stabilize the trunk on the table by holding the edges of the table with both hands.

Synergists: Internal and external oblique abdominals, iliocostalis lumborum, longissimus thoracis, and psoas major.

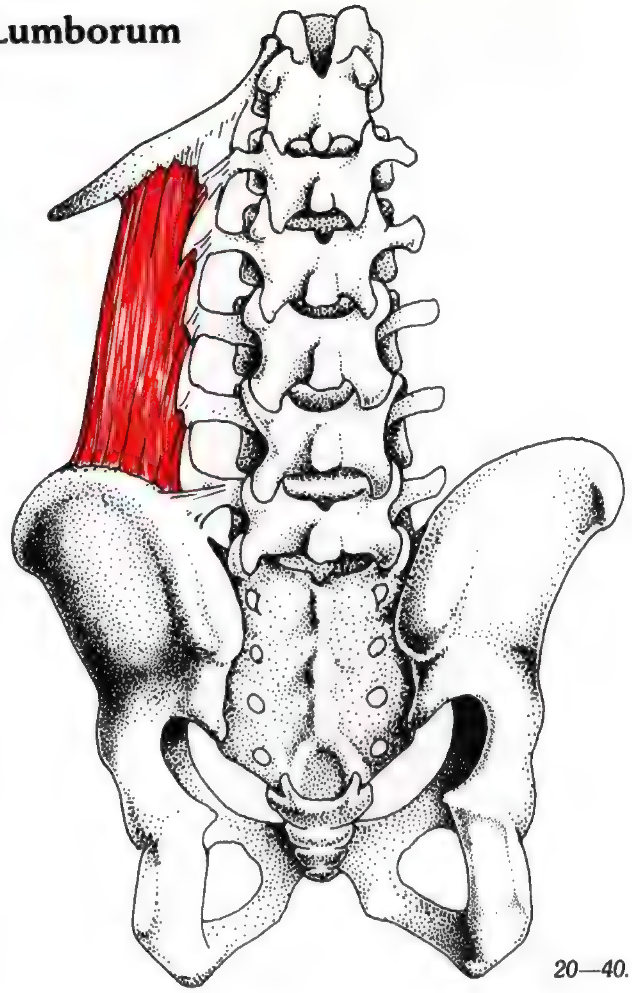
Test: The examiner contacts the ankles by reaching over the legs. The test pressure is directed to bring the legs to the center line of the table. The examiner must observe for separation of the crest of the ilium and the thoracic cage, indicating a failure of the quadratus lumborum to hold the pelvis in a laterally flexed position with the lumbar spine.

Body Language of Weakness:

Testing position: In severe weakness, the patient will be unable to laterally flex the pelvis on the lumbar spine. There may be an attempt to rotate the pelvis along the central axis to increase synergism of the internal or external oblique abdominal muscles.

During test: Patient attempts to dig heels and legs into table with hip and leg extension. The patient may try to rotate the pelvis along the central axis for better alignment of the fibers of the internal or external oblique abdominal muscles for recruitment of synergists.

Postural imbalances: Elevated 12th rib especially observed on postural x-ray. Lumbar spine deviates away from the weak side in standing position, and the pelvis remains level.



20—40.

Nerve Supply: Lumbar plexus T12, **L1, 2, 3**

Neurolymphatic:

Posterior (two): At end and upper edge of the 12th rib, lamina of T11.

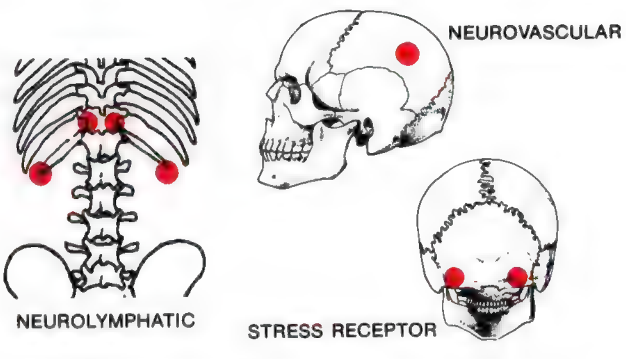
Neurovascular: On parietal eminence, posterior aspect.

Nutritional: Vitamins E, C, and A

Meridian Association: Large intestine.

Organ Association: Appendix

20—41.



General Discussion: The quadratus lumborum is often involved in low back problems. The involvement may simulate the antalgic position of a disc involvement because of the imbalance of the quadratus lumborum muscles. Usually the weaker of the two muscles is primary, allowing the opposite muscle to become hypertonic because of lack of antagonistic activity from the weak side. The approaches used in applied kinesiology to balance muscles are usually effective in obtaining good clinical results. Occasionally it is necessary to add thermal treatment; if so, cold should be applied to the weak muscle and heat to the hypertonic one.

The quadratus lumborum has an accessory role in respiration. It is simultaneously active with the diaphragm in stabilizing the 12th rib, which might otherwise be elevated.[1]

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Glossary

Acupuncture meridian connector: a connection between the spine and the acupuncture system which is correlated with the associated point in meridian therapy. Associated points are points along the spinal column on the bladder meridian. Where there is an active associated point, there will typically be a subluxation adjacent to it.

Alarm points: diagnostic points of the meridian system located in various areas of the body.

Associated points: acupuncture points located along the bladder meridian adjacent to the spinal column which correlate with probable vertebral subluxations when the associated point is active.

Body language: a term incorporating all the observable diagnostic factors which are incorporated in the various processes of dysfunction and disease.

Centering reflexes: reflexes which are considered to be active with the equilibrium proprioceptors to maintain orientation in space, and are balanced between the two sides of the body. The cloacal reflexes are considered to be part of the centering reflex mechanism in applied kinesiology.

Challenge: a mechanism used as a testing procedure to determine the body's ability to cope with external stimuli. The stimuli can be physical, chemical, or mental. An example of physical is pushing on an articulation and determining muscle strength change. An example of chemical is inhaling potentially toxic chemicals or chewing nutritional factors, etc. An example of mental is thought processes, either pleasant or unpleasant to the individual. After the external stimuli is applied, muscle testing procedures are done to determine an improvement or weakening of the muscle strength because of the stimuli.

Cloacal synchronization reflex technique: digital contact on specific reflex centers in order to normalize neuromuscular coordination relative to cloacal centering reflexes, labyrinthine righting reflexes, tonic neck reflexes, and/or visual righting reflexes.

Concentric muscle contraction: contraction of a muscle when the force of the muscle exceeds the external force of resistance, and the muscle shortens (also called isotonic muscle contraction).

Cranial faults: a failure of the skull to move in its normal, rhythmic manner, as discovered by Sutherland (an osteopath) and Cottam and researched by many others.

Crawling: as used by Doman and Delacato, crawling is mobility with the body in contact with the floor. The extremities move in a homolateral fashion typical of the amphibian. As used in applied kinesiology, crawling is a cross pattern mobility along the floor upon the hands and knees. In Doman and Delacato's work this is called "creeping."

Creeping: as used by Doman and Delacato, creeping is mobility along the floor in a cross-pattern hands-and-knees activity.

Cross crawl: an exercise to assist in the re-patterning of certain central nervous system functions.

Dysponesis: "dys" (bad, faulty, or wrong) and "ponos" (effort, work, or toil); a physiopathologic state composed of errors in action-potential output, mainly covert in nature, from the pre-motor and motor cortex, and it includes the consequent action-potentials in descending pathways, side branches, lower motor neurons, skeletal muscles, and the various feedback pathways. Often used loosely to refer to faulty effort of the signaling systems of the body, producing signals which are inappropriate for the body's needs.

Eccentric muscle contraction: a muscle contracting against an external force which is greater than the internal force of the muscle, thus causing it to lengthen while continuing to maintain tension.

Exteroceptor: a sensory nerve ending which receives its stimulation from the immediate external environment.

Fascial release (flush) technique: deep massage applied to re-establish the normal interface relationship between fascia and muscle.

Five factors of the IVF: these are five factors that are involved with the intervertebral foramen and include the nerve, blood vessel(s), lymphatic, cerebrospinal fluid activity, and acupuncture meridian connector.

Fixation: a condition where there is lack of normal motion between vertebrae, usually 3 in number.

Gait points: reflex centers across the top of the metatarsal arches which, when stimulated, can improve the synchronization of any activity relying on crossed-reciprocal innervation (walking, running, swimming).

Indicator muscle: a muscle which is tested to determine if there is a change in its strength as a result of some testing mechanism applied to the body. Generally an indicator muscle is strong prior to the test, and becomes weakened as a result of the testing procedure.

In the clear: testing a muscle and doing nothing to influence either its strength or its weakness.

Ionization technique: a nasal respiratory technique based on the hypothesis that major respiration is intensified in one nostril for a period of time, and then alternated to the other nostril. The balance of alternation is hypothesized to affect ionization balance in the body.

Isometric muscle contraction: muscle contraction producing power, but the external force is equal to the power produced by the muscle so there is no change in its length while contracting.

Isotonic muscle contraction: contraction of a muscle when the force of the muscle exceeds the external force of resistance, and the muscle shortens (also called concentric muscle contraction).

Ligament interlink: a concept which suggests that ligaments in contralateral and analogous joints (e.g., knee and opposite elbow, hip, and opposite shoulder) are related neurologically. Normal function is required for

articular integrity. A special case is the TMJ, which appears to be similarly linked, but to **any** other joint.

Ligament stretch reaction: an abnormal condition where muscles associated with an articulation weaken temporarily after the ligaments of the articulation have been stretched.

Muscle stretch reaction: an abnormal condition where the muscle weakens temporarily immediately after it has been mildly stretched. (This diagnostic test is indication to use fascial release or spray and stretch technique for correction.)

Neurologic disorganization: an abnormal condition where the nervous system is signaling or interpreting signals improperly, causing apparent confusion within the body. Of particular importance in applied kinesiology examination because erroneous information may be derived from the various testing procedures. The condition is sometimes known as "switching."

Neurolymphatic reflex: reflex points originally developed by an osteopath named Chapman for the stimulation of lymphatic drainage of various areas throughout the body.

Neurovascular reflex: reflex points which appear to influence circulatory function in various areas of the body. Originally discovered by a chiropractor named Bennett. The reflexes which have been used in applied kinesiology are primarily about the head. Bennett's reflexes are located over much of the body, but have not been correlated in applied kinesiology.

Ocular lock: a test for function which tests the patient's ability to coordinate the eyes.

Operator prejudice: any attitude of mind or misuse of technique on the part of one performing muscle testing procedures, resulting in unreproducible, paradoxical, or otherwise invalid findings.

Origin/insertion technique: a technique of strengthening muscles by irritating the origin and insertion, discovered early in applied kinesiology.

Pelvic category I: a torquing of the total pelvic structure with no osseous misalignment of the sacroiliac articulations or the symphysis pubis. Causes total body adaptation, particularly at the 1st rib head, shoulder outlet and cranium.

Pelvic category II: an osseous subluxation at the sacroiliac articulation.

Pelvic category III: involves an intact pelvis. The involvement is in the lumbar spine.

Pulse points: diagnostic points of the meridian system located in both wrists over the radial artery.

Proprioceptors: sensory nerve endings which give information concerning movement and position of the body.

Reactive muscle: a muscle which is temporarily inhibited in its function due to inappropriate proprioceptive impulses from another previously contracted muscle.

Running a meridian: the manual tracing of a meridian to alter its relative energy level in order to facilitate (or inhibit) muscle-organ function.

Stomatognathic system: a term used in holistic dentistry that denotes total correlation and interdependence of the cranial bones, TMJ, hyoid muscles, local lymphatic, blood, and nerve supply and other tissues in those areas.

Stress receptors: reflex points located around the head which are capable of inhibiting or facilitating muscle function.

Stretch weakness: a previously strong muscle tests weak immediately following stretching. Usually called muscle stretch reaction. (This diagnostic test is indication to use fascial release or spray and stretch technique for correction.)

Switching: a condition where neurologic disorganization is present within the body. Of particular concern because when switching is present, it causes erroneous information to be derived from various testing procedures.

Temporal tap: a method used to temporarily disturb sensory filtering mechanisms in the brain, to monitor the degree of the effect of therapy or to aid in the modification of habit patterns.

Therapy localization: a procedure of placing the patient's hand over areas of suspected involvement, then using muscle testing procedures to determine any change of strength. Placing the patient's hand on different locations stimulates nerve endings and/or possibly changes the patient's electromagnetic energy field. Therapy localization is strictly a diagnostic tool, and is not for the purpose of treatment.

Triad of health: the factors of structure, mental, and chemical which can cause health changes.

TS line: described by the superior borders of the temporal and sphenoidal bones, the temporal border of the zygomatic bone, and the superior border of the zygomatic arch. Palpable nodules along this line are indicative of corresponding muscular weaknesses.

Index

— D —

— T —

Quick Reference Index to Major Muscle Discussion

Quick Reference Index to Major Muscle Discussion

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